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ORIGINAL ARTICLES

A NEW METHOD FOR THE RELIEF OF LATERAL TENSION IN CLEFT PALATE OPERATION*

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IN order to have the reader fully appreciate my method for the relief of lateral tension in cleft palate operations it will be convenient to describe the technic of combined uranoplasty and staphylorrhaphy.

While much has been said and done in the surgical correction of these defects, the method universally employed is that known as Langenbeck's. The Langenbeck operation is accomplished by dissection of muco-periosteal flaps obtained from either side of the cleft, and sutured in the middle line. Although called after the great German surgeon, and rightly so, inasmuch as he first clearly enunciated the principles underlying the operation, it is certain that similar plans had been previously employed by others.

Operations upon the soft palate were undertaken much earlier than upon the hard. As far back as 1760 a dentist named Lemonnier united the borders of a cleft in a child. Desault and others record similar cases in the first decade of this century.

M. Krimer seems to be the first who attempted operative treatment on the hard palate (1824). Dieffenbach, Warren, M. Beanfils, Avery Graefe, M. Ronx, and a number of others, attempted surgical correction of palatal defects in the early part of the eighteenth century followed by Dieffenbach, Mason, Polloch, and a number of surgeons abroad and in this country.

The Langenbeck operation consists of the following steps:

- 1st. Freeing of muco-periosteal flaps.
- 2nd. Freshening the edges of the cleft.
- 3rd. Placing and tying of sutures.
- 4th. Relief of lateral tension.

*Read before the Kansas City Dental Society, Kansas City, Mo., February, 1916.

FREEING OF THE MUCO-PERIOSTEAL FLAPS.

This procedure is accomplished by cutting the mucous membrane along the entire borders of the cleft and separating the soft tissue by periosteal elevators and cutting the tissue loose from the distal surface of the horizontal plates of the

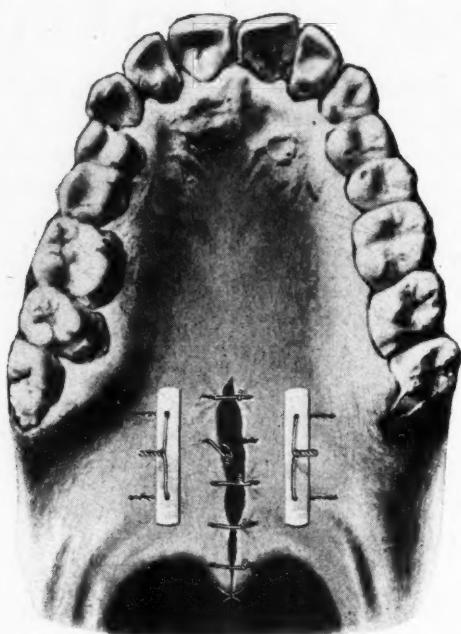


Fig. 1.—Showing lead plates with wire ligatures cutting through the soft tissues.

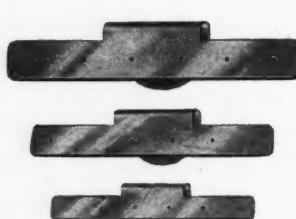


Fig. 2.—Type A. Author's tension plates.

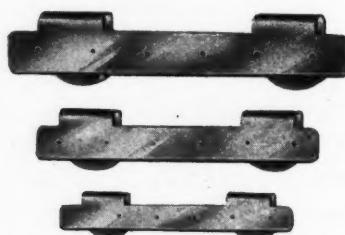


Fig. 3.—Type B. Author's tension plates.

palate bone. This should be done with great care in order to prevent tearing or lacerating, which may seriously impair nutrition. Naturally this brings on considerable hemorrhage which can be stopped by firmly pressing a sponge gauze against the bleeding surface. It is not always possible to avoid wounding the anterior palatine and especially the posterior palatine artery. Should one of the vessels be nicked it will cause severe and prolonged hemorrhage. It is therefore better to completely divide the vessel so that it will contract at its ends, thereby overcoming protracted bleeding.

FRESHENING THE EDGES OF THE CLEFT.

This can best be accomplished by grasping the uvula on one side with a catch forcep and putting tension on the soft tissues, then with a very sharp thin-bladed knife cut a thin marginal strip along the entire flap from the apex of



Fig. 4.



Fig. 5.

the cleft. This same procedure is to be carried out on the opposite side. The freshened surface should be cut square with the flap tissue. A beveled surface is conducive to inviting failure. If the raw surfaces are cut square, it is an easy matter to bring them together in close apposition which will enable rapid union during the healing period. In cases where there seems to be a shortage of tissue in the soft palate I prefer to split the border of the velum about one-eighth of an inch and then unite the raw surfaces.

PLACING AND TYING OF SUTURES.

Various kind of suture material has been adopted for holding the pared edges together, such as silk, horse-hair, linen, catgut, wire, etc. Personally I do not be-



Fig. 6.

lieve that the difference in value of the above named suture-material is of any great consequence, providing the operator does not depend upon the same to overcome lateral tension. Sir William Ferguson, in 1844, recognized that the tension on the ligatures frequently invited failure, either through their cutting out or by shutting off the circulation, thereby bringing on starvation necrosis and infection. To overcome this tension Ferguson divided the levator palati, the palato-glossi, and the palato-pharyngeal muscles. In 1860 Dr. Agnew believed that the tensor palati muscles were responsible by pulling the newly approximated surfaces on the soft palate apart, thus causing the sutures to pull out. Therefore he advocated making an incision close to the hamular process of the sphenoid bone, and in this way overcoming tension. For a long time these methods were extensively adopted by operators in this and foreign countries. The end results were not satisfactory. This was pointed out in a paper by Dr. T. W. Brophy in 1901 in

which he says, "The formation of cicatrices following incision renders the soft palate thick and unyielding, so that its function is performed imperfectly." Dr. Brophy finds it unnecessary to cut the muscles on either side, it was he who introduced the application of lead plates. The advantages claimed for these plates are to render the palate inflexible and the prevention of the cutting out of the

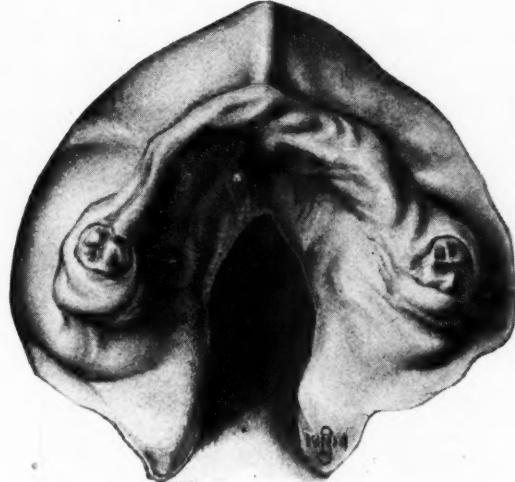


Fig. 7.

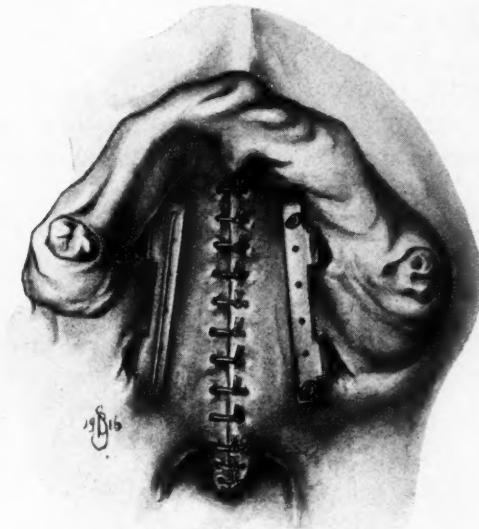


Fig. 8.

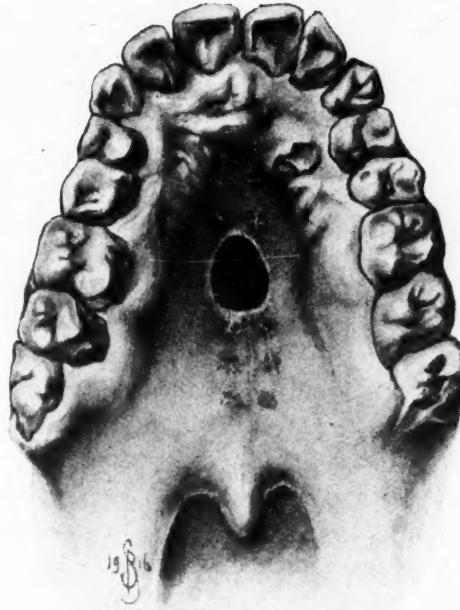


Fig. 9.

sutures. Dr. Blair reports that he has discontinued the use of lead plates as a retention device because they occasionally caused sloughing, in spite of every care; he depends entirely upon the sufficient freeing of the flaps. In my experiences I have never found that the plates cause sloughing, but that they did not

prevent the cutting out of the sutures. (See Fig. 1.) They are, however, of a distinct advantage in rendering the palate inflexible. In order to prevent the cutting of the suture through the soft tissue I have devised a new tension plate which will prevent the suture material from cutting out and at the same time relieve the tension as well as render the palatal tissues inflexible. These plates are made from noncorrosive metal B. I. B. American gauge 22, in various sizes and types. (See Figs. 2 and 3.)

The object of these plates is to prevent the cutting out of the wire ligature which frequently happens with the Brophy plates. In order to fit these plates it is necessary to make a small incision near the gingival border of the last molar, being careful not to cut the palatine artery. (The operator must take into con-

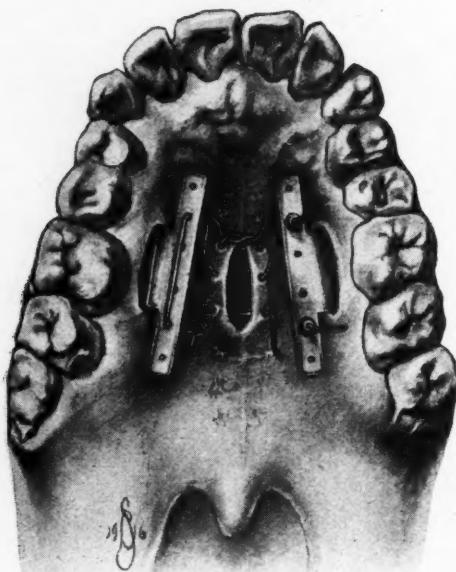


Fig. 10.

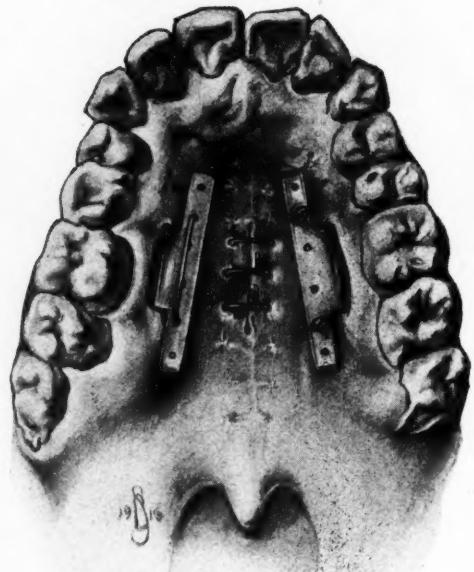


Fig. 11.

sideration the degree of the cleft, the position of the blood vessels and the type of plate that best suits his purpose.) The incision should be of sufficient length to permit the flange of the plate to enter and lie between the palatal bone and soft tissue. Previous to fitting these plates it is necessary to pass silver wire (American gauge 24) through the muco-periosteal flaps and then through the holes in the plates. The ends of the wire are then passed through perforated lead shot and made tense by pulling the wire and crushing the shot after the borders of the flaps can be approximated without tension. After this is done I denude the border of the cleft and then place and tie the coaptating sutures after the McCurdy method.

While to the beginner it is rather a difficult procedure to properly fit these plates he can, with a little patience, soon master the technic of this simple procedure as an aid in obtaining uniform anatomical, as well as physiological results.

Fig. 4 illustrates the cleft of the hard and soft palate. Fig. 5 shows the same case with the plates in position. Fig. 6 shows the same case and the operation

completed. These plates are now relieving the center ligatures so that healing can take place without tension.

Fig. 7 shows an extensive cleft of the hard and soft palate. This patient, for years, had been wearing an obturator. Fig. 8 shows the same case with the palatal opening closed and held so with type B tension plates. Healing took place rapidly in this case and the patient was discharged ten days after the operation.

Fig. 9 illustrates the so-called "button-hole" opening in the center of the palate. This form of opening usually is the end result of an attempt to close the hard and soft palate. Figs. 10 and 11 show the advantage of using the author's type A tension plates for closing the opening shown in Fig. 9.

THE EVOLUTION OF THE PRINCIPLES OF JACKSON APPLIANCES

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PART IV.

Removable Jackson Appliances

THE principles to be pursued in designing lower Jackson appliances are similar to those for upper appliances.

The posterior, side arm anchorages are to be made in the same manner, also all "finger" extensions are to be governed by the same various selective designs for the given conditions at hand. The body wires for lower appliances cannot vary under different conditions, however, because of the limited position which they occupy between the inner surfaces of the mandible and the tongue.

After the side arm anchorages are completed, the first step in lower body wire bending, is to bend the wire into a U shape to fit closely around the lingual curve of the anterior segment of the arch with the ends pointing distally. In placing the anterior portion of this heavy wire, it must be so arranged that the ends may be bent back upon themselves from points in the region of the distal most teeth engaged in the anchorage, running parallel with the lower portion forward, and terminating about midway of the anterior most teeth engaged with spring clasps.

If a straight loop is placed low enough in the sub-lingual region, it will interfere with the motions of the frenum linguæ, which will cut into it in a very painful and damaging manner.

If a straight loop is placed higher than this region, it is very difficult to bend the ends forward, and keep the upper portions low enough to solder along the lingual surfaces of the posterior teeth without touching the lower portion of the wire which it parallels. This renders it very difficult to keep solder from running between the wires and the adjustment is made more difficult in tightening, if the wires are very close together.

In order to compensate between these conditions it is necessary to bend the

anterior end of the wire upward (Fig. 31). The best method for making this bend is to first bend the correct size and shape around the sub-lingual regions, then by grasping the desired amount of the anterior portion between the jaws of the heavy parallel pliers, the bend can be made, retaining uniformly horizontal relations between the ends which point posteriorly (Fig. 32).

That portion which is bent upward can be placed along the most prominent part of the ridge below the gum margins of the anterior teeth, allowing the ends to run backward at positions low enough for the looped parallel ends to fold back and rest no higher than the gingival borders of the posterior teeth, with about one-eighth of an inch between them, thus reducing the bulk, permitting of thin beveled finish, and not interfering with the tongue or pressing against the soft tissues (Fig. 33). This final bend should be made around the nose of round-nosed pliers.



Fig. 31.



Fig. 32.

Fig. 34 illustrates the completed lower body wire suspended in mouldine, slightly away from all soft tissues. Note that the anterior portion rests higher than the frenum linguæ can reach, but at the same time low enough not to interfere with "finger" extensions adjusted to the lingual surfaces of the anterior teeth. The body wire should be "tacked" to position with a very small amount of solder at both posterior ends, leaving ample space between the arms and the upper loops of the wire to form a groove into which to solder the attachment ends of finger springs.

Fig. 35 illustrates the completed appliance for this case. It will be noted that the continuity of this arch has been broken, shown at present by the absence of the left first bicuspid. The normal diameter of this arch is reduced the amount of the mesio-distal width of this missing tooth. Under this condition, the history of the case may reveal the early loss of the deciduous molar with the resultant migration of the approximating teeth, causing the impaction of the bicuspid. A radiograph would prove either this or the absence of the bicuspid by atrophy or traumatism.

Under the above clinical conditions the other parts of this arch have developed under normal conditions.

The environment of the teeth under the influences of the tongue lingually, the buccal and labial muscles and the occlusal stresses have reduced the size of this arch in certain segments which are normal and regular, insofar as the relations between the teeth in these segments are concerned.

If this missing tooth has been extracted to merely correct a buccally erupted cuspid, the same conditions exist from the corrective standpoint on a basis of normal occlusion.

This is a case of neutroclusion, the left molars and the second bicuspid having formed lingually, but have not moved mesially. The anterior teeth have moved lingually, proportionately greater at the left cuspid. The left molars and second

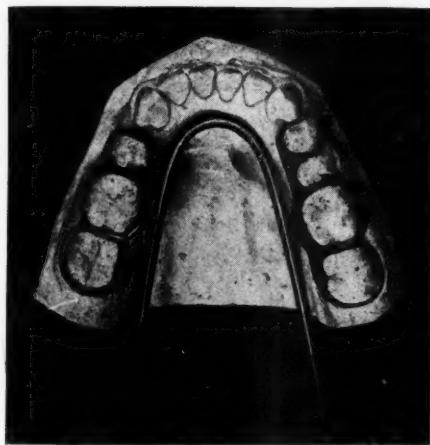


Fig. 33.

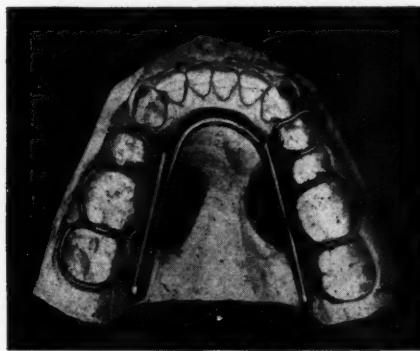


Fig. 34.



Fig. 35.

bicuspid are in correct relations in one segment, the anterior teeth are in correct relations in the second segment, the right posterior teeth are in correct relation in the third segment. The three teeth comprising the left segment are engaged with one full spring clasp on the first molar, with two partial spring clasps on the proximating teeth soldered together on the buccal sides.

There is more constriction on the left side than on the right side, indicating the need of a greater resistance for less expansion on the right side, therefore, the four posterior teeth are engaged on the right side with partial plates on the lingual surfaces, the first bicuspid bearing a spring clasp, but owing to the fact that

the right second molar is not fully erupted, the spring clasp is placed on the first molar. The right cuspid rests at the *rotary center* around which the anterior teeth have moved lingually.

A finger spring is adapted to the curve of the lingual surfaces, soldered into the right arm of the appliance, terminating at the other end in the form of a hook looped around the disto-proximal side of the left cuspid. These anterior teeth may be banded for lugs to be soldered to the lingual surfaces for this finger to snap beneath or a second lingual finger may be adjusted to rest above this lower one for the purpose of holding it securely down to position under active pressure. When this lower spring is rendered active by bending it forward from the right side, each anterior tooth is moved in a different arch toward its normal position.

The finger affords the left cuspid a longer radius through which it moves forward and outward toward a straight line across the arch opposite the right cuspid, to its correct position of angular prominence in the parabolic curve of the normal arch.

The left lateral responds to the path of force applied on a shorter radius than the cuspid, the left central less than the left lateral, the right central less than the

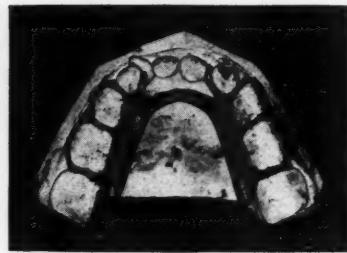


Fig. 36.

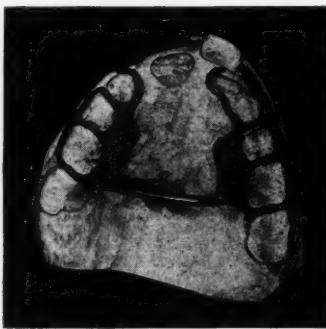


Fig. 37.

left central, the right lateral less than the right central, the right cuspid is only slightly turned; in this way the fingers may be so controlled as to guide each tooth in a segment along entirely individual paths of movement toward their normal positions.

By using the posterior loops of the body wire as rotary centers, a uniformly diffused expansion is applied across the bicuspids and molars. If positive molar expansion is required, the middle of the anterior curve of the body wire is bent open as a rotary center.

In this way individual tooth movement can always be perfectly controlled, under a type of active anchorage, which renders it impossible for unexpected secondary forces to cause warpage of arches or depression, elongation and other displacements of any serious nature.

The Jackson method possesses features of great value for the correction of irregularities of the temporary teeth. The correction of such irregularities usually involves development across the posterior sides with subsequent anterior alignment.

The gingival constrictions of temporary teeth do not always afford favorable undercuts for the spring clasp attachments for simple removable appliances. In

this event, the fixed-removable attachments are better indicated. Even with this method, the technic of fitting simple bands to the anterior and posterior anchor teeth on both sides can be very easily and effectually accomplished in the mouths of children between the ages of five to seven years, after which the bands are removed in a plaster impression and the appliance finished out of the mouth.

In the correction of irregularities during those intermediate years between the loss of the temporary teeth and the eruption of the permanent teeth, the Jackson method is invaluable.

There can be no greater service performed in orthodontia, than the correction of the first appearances of irregularity between the ages of seven to twelve, for by overcoming these original complications, restoring to Nature the normal schedule of development of the arches and eruption of the teeth, the preventative value of such work well done is invaluable.

Fig. 36 illustrates a lower arch with irregularity caused by the early loss of temporary incisors, causing the posterior sides to lose their stimulus or lateral development through the influence of the normal eruption of the permanent incisors. Through this means the permanent laterals are excluded from the arch



Fig. 38.

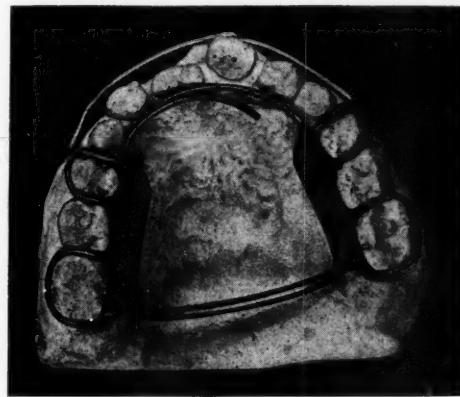


Fig. 39.

and will be forced to erupt in interlocked positions, if the present conditions remain.

This removable Jackson apparatus contains full spring clasps for the second premolars, with partial clasps on the first premolars soldered to the full spring clasps on the buccal sides. The body wire is made of a 13-gauge wire. Small hook-shaped extensions engage the cuspids.

In these two side arms exists a uniform degree of resistance, so that by the very mild, but constant, stimulus of the spring force of the body wire, these sides can be developed laterally, restoring the normal width and concentrating the space gained for the normal eruption of the laterals. If the centrals are spaced, new "fingers" may be added at any time with which to draw them together.

Fig. 37 illustrates the condition formed in an upper arch, origin of irregularity, traumatic injuries causing premature loss of temporary incisors. With this anchorage the fingers may be changed any number of times to meet advanced stages of the work, as each complication is overcome.

Fig. 38 illustrates an anchorage engaging the six year molars with anterior

portion of the appliance designed for the lateral development of the arch, so as to diffuse the space thus gained through the anterior segment of the arch. After the lateral development is accomplished the anterior extensions may be replaced with "fingers" to perfectly align the incisors and in this progressive manner the appliance can never be too complicated to be unnecessarily bulky for the different parts to interfere with the work of others.

Another great advantage in the use of the Jackson method in cases of this age, as in all others, is the ease with which the appliance can be altered to meet the enlarging dimensions of the growing arch, whereas, in all "fixed" apparatus the appliance is very complicated, or in resting at the objective point when first inserted, it stands out from the teeth, cutting the lips and cheeks or it becomes too small before the desired results are accomplished.

Fig. 39 illustrates an arch wherein the centrals were interlapped from severe lateral constriction of the arch. The appliance was originally designed with hooked springs engaging the mesial surfaces of the centrals so as to concentrate the space gained in development between the centrals. Later those extensions were substituted for the labial alignment bow with lingual fingers to attend to the final details of perfectly aligning the incisors.

If trouble is encountered by children less than twelve years of age in the removing appliances, the fixed-removable anchorage should be used. Trouble of this nature is entirely the fault of the operator, however, and is either the result of failure to properly impress the parents with the value of the work, so that they become negligent or by poorly constructed or poorly fitted appliances, the discomfort is too great to tolerate, whereas in fixed appliances, under the same conditions of the operator's carelessness, the patient is helplessly forced to bear.

RETENTION

BY FRANK R. WOODS, D.D.S.

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PART I.

THE practice of orthodontia presents many complex problems, but none more complicated, or, I think, less appreciated and less understood than those of retention. I believe that there are no hours spent upon a case, of which the patient's future good so imperatively demands unerring judgment as those hours given to the consideration and application of the retention. *This consideration and planning of retention must begin before the arches are set for the active treatment,* that no unnecessary tooth-movement shall occur which may preclude the use of the most simple retaining appliances possible for the case. To my mind, the supreme height of orthodontic futility is to carry through carefully the active correction of a case, and then apply an insufficient and illy conceived retention in the sublime faith or wild hope that somehow fortune will incline to the side of the

operator, and may be it will come out all right. If the philosophy of cause and effect has a relentless application to any one science or art more than another, it almost seems to me that orthodontia is the object of its most unremitting attention. No tooth ever stayed in any particular position except by virtue of the fact that the balance of all the forces bearing upon it held it at precisely that point.

It is the almost uniform experience of beginners, and the all too frequent misfortune of many practitioners of experience that active treatment may be carried through with apparent success, the case retained for a period of time which seems in all reason sufficient, and yet, after retention is removed the correction is in large part lost in the succeeding few months or few years, and the original malocclusion is ultimately replaced by another of uncertain degree, perhaps less, perhaps greater than the original.

To many the idea of retention has been that if a reconstructed, or more properly speaking, realigned arch is held for a period of time more or less closely approximating twice the time required to align it, or the period of active treatment, that the retaining appliances may then be removed and the teeth of the realigned arch will remain in their new positions by virtue of having been held there until they have grown firm. This theory has been responsible for endless heartaches, disappointments, and discouragements. No conception of retention could be more erroneous. If the realigned members persist in their new relations after treatment in accordance with this theory, it is the result of merest good fortune, and not because of intelligent plan or adequate conception of the difficulties involved or the conditions to be met.

It will be obvious that every full dentured malocclusion that presents is a mechanically balanced structure. The result of this mechanical balance being an anatomical abnormality in no way argues against its existence. The responsible factors are abnormal forces governing the placing of the teeth in the jaws as they erupt, and the relation of the jaws and arches as units, to each other. These forces we call "Forces of Occlusion." They, in turn are dependent upon normal development and freedom from pathologic conditions of related facial and cranial structures, as well as upon normal general metabolic activity of the individual. So, in permanently correcting a malocclusion, we proceed by correcting an ultimate effect, or result, of an abnormal primary cause, and then depend upon nature's constant effort toward harmony that through the perpetuation of this corrected effect by mechanical means, that subsequent development will proceed in the direction of the anatomical normal, and balance be again so established that the "forces of occlusion," shall ultimately become normal in direction and degree. In other words, the object of retention is to reestablish balance in the facial structure which has been thrown entirely out of balance by the change accomplished in active treatment. It is accomplished by supporting the teeth in their new relations, which are to be the basis and guide in the development of the more remote as well as the immediately adjacent hard and soft tissues. This development will occur as the result of nature's effort to restore balance, symmetry, and harmony. In this unbalanced facial anatomy which we have at the conclusion of active treatment, the factor which is farthest out of balance is the dental arch, by reason of the relatively rapid and large development caused by mechanical stimulation. So the retaining appliances are merely the agents employed to perpetuate the most

prominently inharmonious factor of the facial anatomy existing at the completion of active treatment, the dental arch, until such time as the other parts of the facial structure develop proportionately to it and a harmoniously normal structure shall result.

There is a wide range in the time required to accomplish this balance. It will depend upon the amount of development necessary to restore, or produce, such harmony, and the rate of metabolic activity present in the individual case. This necessary amount of development will in turn depend upon the degree of original variation from normal balance. The rate of metabolic activity will be conditioned upon whether it is occurring during the period of normal growth or after this period is past, and the perfection of the general health and condition of nourishment of the individual. A most happy result may be possible of completion in the occasional case which comes to us with the patient in good physical condition and growing rapidly, with the bicuspids and cuspids almost ready to erupt, and seemingly at almost the same time, though a considerable degree of expansion be necessary and perhaps some incisor rotations. On the other hand, for the mature adult case we cannot even guess upon a time limit, but can only hold on for several years and then releasing them little by little, note the effect and govern ourselves accordingly, replacing parts if necessary, or revising the original retention as seems indicated to afford support, or rather restraint as the balancing process proceeds.

The general health and the rate of metabolic activity will be profoundly affected by the degree of perfection of normal breathing which the patient enjoys, and consequently nose and throat conditions must receive such attention as will insure entire freedom of the air passages from obstruction.

It is obvious that every case is in a large measure, a law unto itself, and that no rule can be evolved so comprehensive, or so perfect, that it can be arbitrarily applied to any considerable proportion of all cases treated, for no two are so alike that they have not very distinctive features of variance from each other.

(To be continued.)

THE HISTORY OF ORTHODONTIA

By BERNHARD WOLF WEINBERGER, D.D.S., NEW YORK CITY.

(Continued from page 450.)

G. CARABELLI (1842-44). Among the numerous publications pertaining to dentistry brought out in the early forties was the important work of Carabelli—"Systematische Handbuch der Zahnheilkunde." An attempt to classify the various forms of occlusion of the teeth had now and then been made, with, however, varying results. Carabelli enumerated and described six forms, all pertaining to bite, or "mordex."

1. Mordex normalis, or normal bite.
2. Mordex rectus, or edge-to-edge bite.
3. Mordex apertus, or open bite.

(Copyright, 1916, by Bernhard W. Weinberger.)

4. Mordex prorsus, or protruding bite.
5. Mordex retrorsus, or retruding bite.
6. Mordex tortuosus, or cross bite.

Under the fourth group, we find the protruding jaw defined, i.e., protrusion of the upper or the lower jaw. This classification was undoubtedly a step in advance, yet it did not meet with the approval of his contemporaries, as we do not find it adopted in their works.

Carabelli devised numerous appliances to correct irregularities of the teeth, and recommended that they be imitated and made use of. His method consisted of a flat band (arch) of gold, extending from molar to molar, the ends of which were curved, so as to encircle the molars, and act as clasps. Attached to the flat metal were two ivory blocks, similar to that of Fox.

By drawing and by pushing the teeth Carabelli succeeded in obtaining the desired results. To accomplish the first object he used silk ligatures or metal wire. The appliance devised by Carabelli was probably as novel and original as complicated. Attached to the anterior surface of the flat band wire were a series of screws. Strings were wound around the teeth to be regulated, and then around a horizontal bar. This bar was free from the band (arch) wire and passed through two upright pieces of metal. Attached to this bar was a ratchet. Between the ratchet and the arch metal proper were wire springs. A watch key was used in order to rotate this bar. Another appliance for pushing the teeth to their desired position, was similar to the one of Schanze's. They consisted of a piece of metal soldered to a screw. The other end of the screw passed through another piece of metal, which was attached to the arch wire by two upright bars. By means of a watch key the screw was tightened, forcing the malposed tooth into position.

Desirabode (1843), in his "*Nouveaux éléments de la science et de l'art du dentiste*," published in 1843, described several inventions that had an important bearing on our work. He was the first to attempt giving this specialty a name and in his article "*Gazette des hopitaux*" (1839) appears the first mention of this particular branch as "Dental Orthopedia."

In his book he has divided the subject into two heads: (1) Dental Hygiene and (2) Facial Orthopedia. Under Dental Hygiene he gives the following:

"We have hitherto been occupied with the anatomical and physiological facts which constitute the science of the surgeon-dentist. But here commences his real art; for we are about to describe, under the name of dental hygiene, a methodical exposition of all the cares and precautions which are intended to facilitate the development of either dentition, or to preserve the teeth in a constant state of health and cleanliness. We will append to this chapter, under the name of orthopedia, and in accordance with the true acceptation of the word, now much used and well understood, a series of means which, although requiring the application of the hand, cannot, nevertheless, be properly considered as operative surgery, inasmuch as they address themselves to conditions which, properly speaking, are not diseases. Such are the straightening, shortening and separating of the teeth; matters with regard to all of which we are about to announce precepts which are rational and of easy application."

Section 1.—Of the Means of Directing the Eruption of the Teeth, and Facilitating their Arrangement.

Direct Means to Prevent Errors of Second Dentition.—“We again see that there are pathological phenomena which signalize the replacement of the teeth, as well as those which appear at the epoch of their first eruption; to prevent these



Fig. 1.—G. Carabelli, 1842.

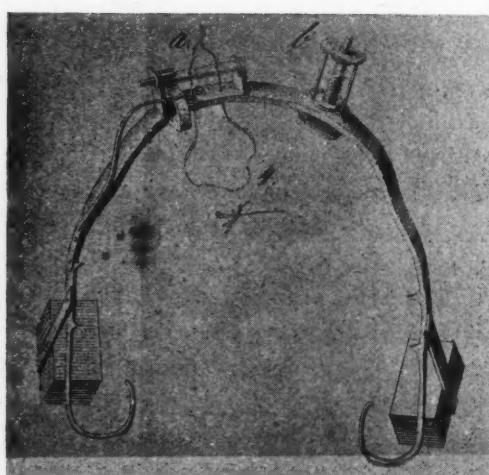


Fig. 2.—Appliance devised by Carabelli.

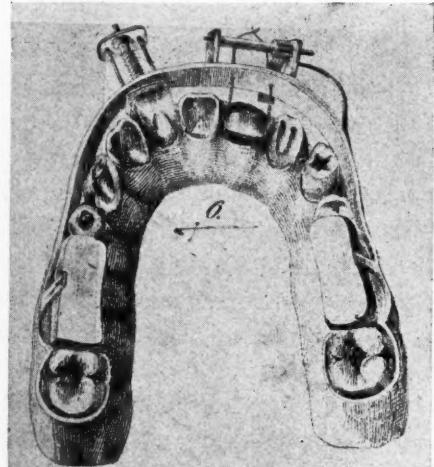


Fig. 3.—Same as Fig. 2 applied to the model.

accidents and apply to them suitable treatment under all circumstances, belong properly to general medicine. But the symmetrical arrangement of the teeth is especially the work of the dentist. What, then, are the means proper to favor this arrangement? Is it necessary, as some ancient authors, and many modern ones, have pretended, to take out early the primitive teeth, or rather to seek to preserve them until they naturally fall out?"

"It is difficult to establish, in this respect, a precept rigorously applicable to all cases. We may, nevertheless, say, in general terms, that unless it is evident that the primitive tooth is an obstacle to the appearance of that which should replace it, the extraction is, to say the least, useless. It is to extend the sphere of our operations, but not to respect physiological functions. But in the case, on the contrary, where the tooth is a mechanical cause, hindering the permanent one from developing itself properly, or to place itself in its proper position, there is an absolute necessity to remove it; for by delay we expose the child to irregularity of denture, a deformity easier to prevent than to cure."

"This operation has for a long time been opposed by the fear of removing with the milk tooth the germ of that of replacement; but this fear can now have no influence, except for practitioners who do not know that from the age of four and a half to five years this germ is entirely ossified, and no longer touches the primitive tooth, whose root begins to disappear."

Under Orthopedia he has attempted to classify the subject according to the position the teeth assumed, and the causes of these positions.

"Orthopedia. Of the Means of Remedying Irregularities of Dentition—Vices of Conformation Dependent Upon the Teeth."

"In describing, with all necessary minuteness, the care necessary for the preservation of the teeth, we have admitted that they were regularly arranged; but, whatever care we take to favor this arrangement, it happens but too frequently that they persist in taking a wrong direction. Our art is not helpless under such circumstances; it is only necessary to be well persuaded that the success of our means will depend much upon the circumstances under which they are employed. As to the nature of these means, they are far from being, as some recent writing would inculcate, modern discoveries. There is not a dentist who has practiced for thirty years, who has not employed, every day, the very means now in use, and if some practitioners seem to make this a subject of particular attention, this is rather the result of enlightened public opinion, which better appreciate these things, than of anything they have added to former knowledge."

"The irregularity of the teeth depends either upon their deviation, their formation or implantation. Each of these vices may be carried to the extent of true deformity. Let us first examine the vices of deviation."

"These irregularities are commonly known as obliquities. The obliquity may be forward, backward, laterally, or by rotation, according as the teeth which constitute it are directed outward or inward, mount upon the faces of their neighbors, or have undergone such a movement that one of their sides presents forward, and another posteriorly."

"The primitive or temporary teeth rarely exhibit these deviations, and when they exist, they are generally so little important as to be unworthy of attention.

As to the secondary teeth, the incisors and canines are most frequently thrown out of their proper place, which is readily enough explained by the fact that their roots are single, and occupying less space in the alveolar border than their crown does beyond it, they are more exposed to forces which may be brought to bear upon them."

"It must not be supposed that any great force is necessary for this purpose; it only requires a slight default of antagonism between two powers in the midst of which the teeth are placed, that is to say, between the lips in the front and the tongue behind. Do we not perceive that, in almost all cases of hare-lip, the teeth corresponding to the fissure, throw themselves forward; and that the operation which causes this deformity also replaces the teeth? This is an important fact, which goes far to enlighten us upon the choice of means proper for replacement."

"If we study the causes which produce these deviations, we find it sometimes in an organic malady of the alveolar border; but the more common cause, as we have already said, is the defect of relation between the size of the teeth and the space they ought to occupy; the tardy shedding of some primitive tooth, the presence the tooth trespassing upon the space proper to another finally, the existence of a supernumerary tooth, which we have called a surplus tooth."

"Art has two kinds of means of remedying obliquity; the first acts slowly, continuously, and are incapable of occasioning the least accident or even the slightest pain; the other, on the contrary, acts promptly but painfully, whence they would be abandoned, even if there were not other peculiar inconveniences attending them."

"The first of these expedients consists in bringing back the distorted tooth into its proper place, by the aid of traction exercised upon it by ligatures, which have their point d'appui upon the neighboring teeth; but two conditions are necessary: there must be sufficient space to receive the tooth, and the tooth which forms the basis of support to the traction must be more firmly fixed than the one to be removed."

"As many persons doubt the success of this proceeding, it is proper to observe, that the tooth to be removed does not represent an inert force to be overcome, but an active force, the direction of which should be changed. Let us reflect upon the facility with which the most firmly resisting of our tissues yield to the action of slight forces when long continued; and we will perceive that there are few cases in which a simple lever, skillfully used and firmly fixed, will not suffice, especially in young subjects, to replace a tooth, however distorted it may be. Everything depends, with these cases, upon the address and judgment of the operator."

"But should we have threads alone, reckoning upon their own elasticity, or only use them as means of attachment? We believe that threads have rarely the power supposed, and experience shows that they are fraught with great inconvenience. In the first place, they loosen the teeth around which they are thrown for support and again, they strip these as well as those to be removed, and act on the tooth too near the neck."

"We know that, to obviate the loosening of the supporting teeth, those are chosen which have stronger roots than the irregular teeth; and that to prevent

the ligature from gliding under the gums, use is made of a small hook, one of the curves of which fits upon the cutting edge of the tooth, while the other holds back the ligature. But, on the one hand, the form of the roots is too variable to permit us always to calculate upon their respective forces, and if on the other hand, the hooks applied which always impede the action of these last, and hinder it from being direct."

"Thus, then, if we would act with certainty, we ought rarely to confine ourselves simply to ligatures. There being a certain resistance to overcome, as must be the case in patients somewhat advanced in age, we may augment the power of the ligatures by combining their action with those of different apparatus, commonly described under the name of plates or bands. These are a kind of metallic springs, narrow and thin, adapted to the contour of the alveolar border, and applied in front or behind this border, according as the irregular tooth has deviated forward or backward; but better still, a double band, which gives to the thread a surer support, by hindering it from gliding upon the crown of the tooth, especially towards the neck. In order to explain their action and the mode of applying them, we will cite an example. Let us suppose an incisor thrown forward and having space enough to permit it to be reduced into line. We make the mold of the defective dental arch, as it will be described in the 'prothesis.' Then, upon the posterior and anterior faces of the teeth, we adapt a bandlet of gold somewhat less wide than the height of the teeth, but touching them all in the direction of the alveolar border, terminating at each of its extremities by a kind of bracelet, or better still by a true cap, which envelopes the two last molars, upon which we wish to take a firm support. Before applying this little apparatus, we pierce each bandelette with two holes in the same horizontal direction, and precisely at the point corresponding to the irregular or oblique tooth. Finally when it is applied, we pass through the holes a thread of raw silk waxed, or of platina, and twist them around the tooth to be replaced."

"This apparatus, which is the only one we employ, as it is much more sure than the simple thread, has this advantage, that its action is constant. This continuousness results from the incessant action of the spring reacting upon the thread. The power may be increased by so arranging the spring that it shall not touch the teeth which form the sides of the vacant space to be filled by the tooth to be retained. We have cited the simplest cause in which the band is applied, but it is easy to perceive that it might be used upon several teeth as easily as upon one. It is only necessary, in complicated cases, to pierce the bandeau with as many holes and pass through as many ligatures as there are irregular teeth."

"Whatever modern authors may say of the means we have described, claiming it as their own invention, and supposing upon the ground of some modification, that they have 'resolved a problem never before thought of,' it is nevertheless true, that it was known to the ancients. A detailed description of it may be found in Fauchard, and if our predecessors have not derived as much benefit from it as ourselves, it was because they did not avail themselves of firm points d'appui, a first condition in all apparatus of replacement. When one has become familiar with the mode of applying bandeaux, formerly called plates,

and which are nothing more than springs, he will perceive that they are only applicable to anterior and posterior displacements; but generally simple ligatures are used to correct lateral and rotated obliquities. In the first case, the thread is firmly fixed upon the last or even the two last molars of the side opposed to the deviated tooth, and we tie it upon the latter, causing it to pass in front of the neighboring teeth, when the tooth presents inwardly, and vice versa. This direction of the ligature exercises less traction between the two lines which the tooth must traverse in order to reach its place, for it is evident that if, in a case of inward lateral obliquity, an incisor for instance, the thread departed from the inward face of molars, it would only draw backwards, but not into the vacant space to be occupied."

"As to rotary deviations, they are generally corrected by surrounding the tooth with a strong silken thread, one of the ends of which is carried inwards, the other outwards, to be fixed upon the last molars. As these teeth, especially if they are incisors, leave sufficient scope, by the very fact of their movement, to the means to be employed for their restoration, we surround them with a little ring, which embraces them exactly, and bears in front and behind a small hook, into which the thread is received to go to fix itself upon the molars of each side,



Fig. 4.—Various appliances used by Desirabode.

either directly or by the intervention of a little cap placed upon these latter, or a small ring upon which a thread may be tied."

"Generally, by these and similar means, we may succeed, in less than a month in restoring a tooth to its natural place. In the course of treatment the ligature must be changed and readjusted every three or four days. When the desired end has been obtained, we sustain the tooth for one or two months, or more, by means of a smaller ligature or gold thread, until the alveolar border shall have acquired sufficient firmness to maintain the tooth in the direction given it; but what is yet better is to cause the patient to wear at night a kind of metallic capsule, fitting exactly upon the teeth, and enclosing not only the restored tooth, but those surrounding it."

"We may perceive the importance of this, if we remember the intensity with which the jaws are sometimes clenched at night. We have seen this so strong as to displace artificial pieces, when inconveniently arranged. It is well to take another mold of the mold after the success of an operation of this kind, as, by the comparison of this with the previous mold, we may better judge of the result in all its extent."

"We have remarked that besides ligatures there was another way to restore a deviated tooth to its natural direction. This means is incomplete luxation; as it is not without danger, it should never be tried except when the in-

efficiency of ligatures is well established, as in the case of an individual of twenty or thirty years old, in whose case one or two teeth should project with the alveolar border. If the operator concludes that the space destined for the distorted tooth is not large enough to receive it, he will file away the adjacent tooth and the displaced tooth, until the necessary size is obtained, when he will luxate the latter, and restore it to its proper position."

"Pincers will ordinarily suffice for this purpose; but in order to succeed it should be done with all possible care, and all effort should cease as soon as it is brought to the level of the others. It is then prudent to preserve it in its new place by ligatures. Some weeks will suffice, it is said, for the alveolar border to adapt itself intimately and render it as firm as before."

"But, we repeat it, this maneuver, which properly belongs to surgery is not only of doubtful efficacy, but may be attended with disastrous consequences. It is indispensable, indeed, that in practicing it, even with all possible care, we may not only break and tear the gums, tear the alveolo-dental periosteum, fracture the alveoli, but even break the tooth. Therefore, we have never undertaken it, and we advise all young practitioners to avoid it, or never attempt it until they have well balanced the changes."

"We have all along supposed either that the space proper to the tooth remained unoccupied, or that room could be made by extracting a tooth. When, however, there is nearly sufficient space it is not necessary to make such a sacrifice. The end can be obtained by filing slightly the sides of the displaced tooth or of those between which it is placed, as we have already said."

"Pathology and Therapeutics."—Of authors who have written on specialties on our art, some as Maury, holding no account of the relations of organization of the end which unites the dental bone and its central ganglion, content themselves with dividing the diseases of the teeth into those which relate to their hard parts and those which affect their soft parts; whilst others, as Lefoulon, having no very just idea of that which they ought to understand as diseases, have added to the number of those of their teeth, simple anomalies of form and of arrangement. More logical in this respect than those, we have arranged changes of the organs, which we shall now treat of into three distinct classes."

"The first includes the vital or pathological changes properly so called which, are injuries of the follicles; erosion or atrophy of the teeth; discoloration and decomposition of the enamel; consumption of the roots, caries and its different varieties; exostosis and the spinal ventosis; softening; inflammation; fungosity; ossification even of the dental pulp, and finally the different nervous affections of the teeth."

"The second comprehends, on the contrary, injuries purely physical, as the wearing away, cracking and fracture of the teeth; their loosening, fluxion and denudation."

"Finally we have arranged in the third class of the diseases of the auxiliaries of the teeth, either the diseases of the gums of an inflammatory nature, or the diseases of the alveoli."

C. J. Linderer (1837) in his "*Handbuch der Zahnheilkunde, etc.*," gives an essentially different classification of irregularities of the teeth than the one of Kneisel's. In 1842-48 he brought out what was considered the best and most

important publication devoted to dentistry in the German language. His chapter on irregularities of the teeth is interesting and includes several novel means to correct these conditions.

Linderer believed in extraction of certain teeth when carious or diseased, even if they were permanent, but advocated the retention of the deciduous ones as long as possible, as they influenced the development of the dental arches. He also believed that if precaution is taken in time, prevention of irregularities of the teeth may be accomplished by retaining the deciduous teeth until the permanent set erupt, or the timely extraction of those teeth, by extracting a new tooth, and by means of the file when the teeth are crowded.

Linderer classification consisted as follows:

1. Impacted teeth.
2. Rotated teeth.
3. Open bite.
4. Teeth in unusual positions.
5. Slanting teeth.
 - a. Inversion, or where teeth projected inward.
 - b. Retrocession or where teeth projected outward.

He mentioned five ways of correcting or regulating the teeth.

1. Moving the teeth inward.
2. Moving the teeth outward.
3. Moving the teeth sideways.
4. Moving the teeth inward or outwards and forward and backwards at the same time.
5. Rotation.

He stated that this may be accomplished by means of the pincers and the pelican, by the use of the finger and by means of various appliances. Before beginning the treatment he recommended that a thorough study of the case be made and that one should be sure of the method of procedure, then procure the necessary expansion or room. Linderer advised early treatment because he felt that better results could be accomplished; he was also of the opinion that good results could be obtained even past the age of fourteen.

The means of accomplishing the work with appliances was by the use of wooden wedges, rubber plates, clasps as used by Maury, ligatures and bands, and the inclined plane of Catalan, Hunter, Delabarre, Kneisel and Schanage.

Linderer's early method (1837) consisted of double ligatures which were tied to molar teeth and wound around the teeth as required. To prevent the ligatures from slipping, another piece of ligature thread was tied linguo-labially and over the incisal edge.

The apparatus for widening the dental arches consisted of a rubber plate which was perforated for ligatures attached to the posterior teeth. Attached to the plate anteriorly were clasps that pressed against the incisor or posterior teeth as the case required. In this manner expansion was brought about.

Open bite cases were treated by means of extraction of upper or lower molars or both. In raising the bite Linderer also made use of the ivory blocks as advocated by Fox, or the gold caps or crowns. To rotate a tooth, a gold band

was used upon which a round wire was soldered, the free end being rounded, served for fastening the ligatures.

Edward Maynard (1843) "*The American Journal of Dental Science.*" "As no notes were taken during the treatment, I am unable to give the time required for each step of the cure. I saw the patient every few days, and made the applications herein described, as change in the positions of the teeth indicated their propriety. On the 7th of September, I extracted both the first superior bicuspids, and directed the patient to return as soon as the inflammation consequent upon this operation should have slightly subsided. Having met with an accident, he did not return for several weeks. At the next visit, I passed an elastic thread (made of sewing thread and gum-elastic) around behind the first molar and before the cuspidatus of one side; the two ends of the thread were then tied tightly, and the corresponding teeth of the other side were treated in like manner. These threads were several times renewed as shorter ones became necessary. As both sides were treated alike it will be sufficient to particularize the treatment of but one of them. Having drawn the cuspidatus about one line back, a thread was now passed between the bicuspids and first molar; then the end towards the cheek was passed between the first and second molars; this gave both ends toward the palate; then both ends were brought forward and tied tightly before the cuspidatus, thus changing the direction of the force by making the bicuspid serve as a pulley. But this pulley would serve as such but a short time, becoming, itself, loose in a few days. I then let the threads of both sides remain to keep the cuspidati from returning while the parts adjacent to them were allowed to rest a few days and recover from some slight soreness, and directed the treatment to the incisors."

"A slip of gum-elastic was placed between each lateral incisor and its adjoining central, which separated the teeth at these places about half a line. A stick of hickory pivoting was then split in two, and cut off the right length to reach from the depression in the back of one lateral incisor to that in the other. This was cut away toward each end so as to form a spring, thickest in the middle, where a non-elastic thread was tied fast. This spring was placed against the backs of the lateral incisors and held there by the patient pressing forcibly against its middle while both ends of the thread were brought forward between the central incisors and tied tightly over a thin stick two lines long of the same wood, laid across the space between the centrals. This carried the lateral incisors forward and outward, while it slightly rounded the angle formed by the centrals. This last effect was sufficiently produced afterwards by applying a like spring, in like manner, except that its ends rested upon the backs of the central incisors, at those parts nearest to the laterals."

"It will be seen from this account that no metallic bars, frames, blocks, hooks or spring,—in fact, no metal or anything of like rigidity was used. The patient attended to his studies and other duties as he would have done without the treatment; suffering little if any pain, and but slight inconvenience. Probably much less time would have been required for the operation, but for the accident which delayed it at the commencement."

Here again we find the use of gum elastic employed in the correction of irregularities of the teeth prior to the time of Tucker.

Sam Ghimes (1843) speaks of the underhung jaw being due to the "upper incisors extending inwards, and on closing the mouth they come in contact with the lower; this makes the child inclined to protrude the lower jaw, which finally becomes habitual, and promotes the increase of the length of the jaw itself."

Paul Goddard, in "*Anatomy, Pathology and Physiology of the Teeth*," 1844, expresses the opinion that the most prolific causes of irregularity is want of room in the dental arches. This arises sometimes from congenital effects, but more commonly from early decay and loss of the temporary teeth which, failing to keep up the alveoli, enable the jaw to contract and thus afford too little room for the permanent set. Another cause is the position of the temporary teeth and the germs of the permanent teeth.

Goddard states that irregularity may be divided as follows: First, Irregularity of position and direction; Second, Irregularity of formation and shape; Third, Irregularity of number.

"The most simple form of irregularity in the cupidati consists in an obliquity of position in their sockets, the face of the tooth turning either to the right or left, to a greater or less extent according to the want of room in the dental arch. This malposition arises from a total want of room for them in the dental arch and is consequently difficult,—exceedingly hard to remedy."

"It may be remarked that irregularity in the incisors, especially when it is confined to one or both teeth, is far more common in the upper than in the under jaw. The simplest and most common derangement is an obliquity of the lateral incisors, which is sometimes so great as to cause them to present their edge outwards; in this case the central incisors are more or less crowded together and occasionally form an angle with each other, the apex of which points either inwards or outwards, but is most common in the latter direction. Another deviation is the projecting backwards or forwards of a single tooth, generally one of the central incisors, which in some cases deviates so far from its proper direction as to grow directly inwards towards the tongue, or outwards, as if it would perforate the upper lip. In a third case, the incisors come down in their proper direction, but some distance too far back, so as to be in the roof of the mouth; this usually happens to the lateral incisors."

"The forms of irregularity treated of so far, are those which affect individual teeth, but it becomes a very important subject of consideration to the dental surgeon, when he is presented with deviations affecting the whole of the front set, upon which the shape of the face and the speech of the individual so much depended. The most common deviation affecting the whole mouth is the projection of the lower jaw over the upper, so as to produce a false closure as it is called."

"Now when this deformity—false closure, exists, the relative size of the teeth is not altered, consequently the lower jaw becomes deformed, is elongated and its angle rendered very obtuse. Anyone understanding the principle of the lever, will see that great loss of power in the muscles of mastication must result, and to this is added a loss of the lateral motion of the jaw masticating food properly. Occasionally the want of room in the upper dental arch is so remarkable that the teeth are forced to arrange themselves in two rows, and the

lower set closed in between them. The mouth in these cases is remarkably small, and there seems to be a congenial defect in the size of the jaw, the appearance produced being very curious."

TREATMENT OF THE FIRST FORM OF IRREGULARITY.

"In commencing an account of the treatment of these deviations, it may be well to remark that the age of the patient is a most important item to be considered in making up an opinion as to the probable success of surgical interference. Previous to the age of fifteen the remedies are very apt to prove successful, but after that the treatment becomes progressively more tedious, difficult and uncertain. If pressure is made upon one side of a tooth at any period previous to the completion of the ossification of the skeleton, it will produce an absorption of that side of the alveolus against which the fang is made to press out, being attended with a disposition of bone on the opposite side, *pari passu*, so that the tooth slowly changes its position without ever becoming loose in its socket. Having taken the age of the patient into consideration, and determined to proceed, the operator must next inquire into the causes producing the deviation from the normal state, and begin by removing them when practicable."

"The successful treatment of irregularity must also depend upon both the extent and nature of the deviation of almost every variety requiring either a modification or total change of treatment."

"When the incisors of the upper jaw come out irregularly, particularly when they are behind their temporary antecedents, these must be removed to make room, and even when the deviation extends only to the central incisors the four temporary require removal, for the permanents being broader than their analogues of the milk set, there will not be room enough made by their removal alone. After the required room is thus obtained, pressure made by means of a tooth-brush handle or a hickory stick and perseveringly applied by the patient will soon cause the affected teeth to take a correct position. Constant pressure with the thumb will suffice in many cases. When this deviation occurs to the incisors of the lower jaw, it will suffice to remove the temporaries as the tongue of the little patient will push them forward into their proper places."

"One of the most difficult forms of irregularity to remedy in the incisors, is obliquity arising from want of room for their normal arrangement. As their obliquity gives rise to much deformity, particularly in the upper jaw, it is important to pay great attention to its treatment. This must be commenced by making room for the oblique tooth. A file may be passed between each of the front teeth, taking care not to cut through the whole thickness of the enamel, and to carry the file well under the gum so as to clear the teeth completely. If this does not give room enough pieces of gum elastic must be squeezed in between the teeth and renewed every day or two. Its elasticity aided by the warmth and moisture of the mouth, will soon increase the space so that the subsequent part of the process may be commenced. Occasionally this mode of applying gum elastic will answer without filing, which should always be avoided if practicable. This plan of expanding the dental arch and thus separating the teeth will not answer as well for the lower jaw, because its size is limited by that of the upper jaw, and if filing should not afford room, one of them may be extracted, which will rarely excite observation."

"In those cases in which the teeth have come out in an improper position the treatment must be adapted which is applicable to the projection of the lower jaw beyond the upper, for the principle involved is precisely the same. The first step is to keep the jaws separated so that the teeth to be rectified should not meet or pass each other."

Edward Saunders (1844), "*American Journal of Dental Science.*" "Having pointed out the means of correcting that form of irregularity which consists of inclusion or recession, and which results from the upper tooth passing behind the lower row on closing the mouth and consequently being founded within the dental arch, it now remains to consider the mode of reducing such teeth as are external to it. These cases have as mechanical causes the pressure of contiguous teeth, arising from an overcrowded state of the mouth, a want of expansion of the maxillary bones, or an irregular state of the opposite rows, and those which are altogether independent of these causes, and are due to a preternatural development of the upper jaw forwards, combined more or less with lateral contraction. In the former, the indications are of course to liberate such teeth by expanding the arch, or by removing one or more of the adjacent organs, according to the peculiarities of the case. It frequently happens that with inclusion of the lateral incisors, there occurs protrusion of the centrals, while the former are locked in by the cupid teeth, which usually occupy a prominent position. If in these cases the teeth are not proportioned to the maxillary bones, and especially if the denture be flattened at the sides, or opposite to the angles of the mouth, regularity may be affected without the sacrifice of any of the teeth."

"A plate of gold or silver is adapted to the palate and gums as far as the bicuspid teeth on either side, to which it is firmly united by a ligature on each side. One end of a piece of tightly coiled gold wire is attached to some point near to the posterior margin of the plate while the other is fixed, in a state of tension, by means of a silk or wire ligature to the irregular tooth. A convenient method of uniting the spring to the plate is to screw it on to a piece of wire bent at right angles, and soldered to some point in the direction in which it is desired to use traction upon the tooth; its free end may be readily secured upon the irregular organ by turning down the two final rings so as to form a loop, through which a ligature or fine wire may be passed. This case obviously belongs more to second class deformities rising from preternatural development of the upper jaw, inducing a protrusion of the teeth in the anterior part of the denture. These are not only more difficult of reduction, but exhibit more or less tendency to regain their old position, a tendency further increased by the habit of closing the mouth with the upper incisors external to the lower lip."

"A strong bar is adapted to the external surface of the teeth of the superior denture, having its attachment to the molars. The lateral incisor on the left side is within the dental arch, while the right central is developed prominently forwards. Opposite to the latter is a screw, which may be turned by a small key; for the education of the lateral is a complete windlass, to the roller of which the two ends of a ligature are secured, which has passed behind the irregular tooth. In all cases in which it is required to bring the tooth inwards, one practical obstacle presents itself in the swelling and puckering of the gum, arising from the absorption taking place more slowly in the lateral structure than in the

alveoli of the maxillary bones. To obviate the difficulty arising from this cause, it is desirable to leave the edge of the plate free posterior to the teeth about to be moved, and cut away or raise it, from time to time, as may be found necessary. Notwithstanding these precautions, however, the gums may become so soft and irritable and in such a state of congestion as to make it desirable to discontinue the use of the plate for a brief interval. Under these circumstances the simple bar of gold external to the teeth secured to the molars and made to exert pressure by means of wooden wedges upon the irregular teeth, is a valuable and efficient substitute."

Charles Marmont (1844) in "*La distole ou methode—de la bouche*," advocated extraction of teeth, especially the first permanent molar, in order to move the premolars back, so that the cupid might move into its proper place. He also laid claim to being the originator of the idea of expansion of the dental arches.

Robert Arthur (1845) in "*A Popular Treatise on Diseases of the Teeth*," stated that "Irregularities of the teeth may proceed, among others, from three principal causes; First, the presence of a greater number of teeth in the mouth than is natural, second, a deficiency of space in the jaws; third, a wrong direction given to one or more at the time they make their appearance. A deficiency of space may rise from a contraction of the jaws in consequence of the too early extractions of the temporary teeth; from some original malformation of the jaws, or from a great excess in size of the second set over the first."

"It was for a long time, the opinion of a large part of the community that, if the teeth of the first set are allowed to fall out, naturally those of the second set will be irregular. It being necessary, consequently, to force the poor child to a dentist, before the teeth were even loosened and have them dragged out, regardless of pain inflicted for the purpose of insuring a regular set of teeth."

"We have pointed out the circumstances attendant upon a natural and orderly change of the teeth; but this change, as we have already intimated, is not always accomplished, with so much regularity; it may, from various causes, be disturbed. The secondary teeth may be diverted from their natural course in various ways, and much irregularity in their arrangement produced. As the order and time of the shedding of the teeth are now fresh in the memory of the reader, this seems to be the most proper place to introduce such directions, for the management of the second dentition, which will, if put into practice, prevent these irregularities, and their injurious consequences."

"At the time when the temporary teeth are about to be shed, the mouth of the child should be frequently and carefully examined, and, as the front teeth are generally the subjects of irregularity, this attention should be particularly directed to them. As long as there are no signs of the coming of the second set, the first teeth should be allowed to remain undisturbed, but the moment the cutting edges of the central incisors are seen piercing the gum, either on the outside or inside of the alveolar arch, the two temporary incisors, if they are still remaining, should, without delay, be extracted. A little time should now be allowed to elapse, and, when the central incisors rise in their sockets, if there is not sufficient room the two temporary lateral incisors, if they still remain, should be removed. The permanent central incisors, if no other obstacle is pres-

ent, will now take their proper places, but as soon as the lateral incisors appear, the canine teeth, if there is not room, must, in like manner, be removed. After this it will rarely be necessary to extract any more of the temporary teeth for the purpose of preventing irregularity, and it will generally be found that if there is still a want of room in the jaw, that the canine teeth, which come last, will be thrown out of the arch. The method of correcting this irregularity will be shown presently. In cases, however, where the permanent canine teeth make their appearance before the temporary molar teeth are shed, and these do sometimes present themselves, it will be found necessary to extract the latter to give room."

"We must here take occasion to deprecate an injurious custom which had its origin in a most strangely founded popular prejudice, but which, at present, has, we are glad to believe, passed almost entirely out of use. To some extent, however, it is still practiced. It was, for a long time, the opinion of a large part of the community (and it conflicts, strangely, with their ideas of the efficiency of nature in some of her other operations) that, if the teeth of the first set are allowed to fall out, naturally, those of the second set will be irregular when they make their appearance. It became necessary, consequently, to force the poor child to a dentist, before the first teeth were even loosened, and have them dragged out, regardless of the pain inflicted, for the purpose of insuring a regular set of teeth in after life. If there were no other objection to the extraction of the first teeth, at this time, than that it is the infliction of unnecessary pain, that would be sufficient to condemn it; but, instead of preventing, it will cause future irregularity of the second teeth. If these teeth are removed before the second teeth are ready to come up, a permanent contraction of the jaw will take place, and, as there will not be sufficient room for the second teeth, when they do appear they must be more or less crowded together. It must not be supposed that this is mere theory (although as theory it is in perfect accordance with what might, under such circumstances, be expected to take place); experience has proved, in a great number of instances that it is an invariable result. Besides this, a too early extraction of the temporary teeth, by breaking up the connection between the two sets, may so disturb the growth of the permanent teeth as to stop their further development, or to divert them from their natural course."

"The first teeth should never be extracted except when it is found that they are in the way of those of the second set, or when they are so much diseased as to affect injuriously the surrounding gums and sockets. When toothache occurs, it may be readily and permanently relieved by the preparation which will be indicated when we come to treat of diseases of the permanent teeth."

"But, although the second teeth may have taken the most irregular positions in the jaws, the deformity is not beyond the reach of remedy."

"1st. The presence of supernumerary teeth, although not of very common occurrence, is a more or less frequent cause of irregularity. The degree of irregularity may be confined to that produced simply by their presence near the regular dental arch, or they may displace some of the other teeth. They are generally formed near the front of the mouth, most commonly on the inside of the upper jaw, but are sometimes found as far back as the wisdom teeth. They

are usually isolated, but cases are recorded of duplicates of all the incisors of the lower jaw. The crowns of these teeth are generally of an irregular conical form; they have short, crooked roots. Wherever they are present, they should, without hesitation, be extracted. Great caution should be observed, however, to be certain that irregularly situated teeth belonging to the natural set are not taken for supernumerary teeth. This may always be determined when they occupy the front part of the mouth by examining whether the ordinary number of incisors and canine teeth are present. Any irregularity which they may have produced in the arrangement of the rest of the teeth must be corrected in the manner presently to be shown."

"2nd. The second cause of irregularity, a deficiency of space in the jaws for all the teeth, is of most common occurrence. This may arise from a contraction of the jaws, in consequence of the too early extraction of the temporary teeth; from some original malformation of the jaws, or from a great excess in size of the second over the first teeth."

"It would be impossible to enumerate the variety of unsightly irregularities dependent upon this cause; it may be useful, however, to mention some of the most common. The whole of the upper incisor teeth may project in such a manner as to throw out the lip considerably, and display their cutting edges when the mouth is opened. One or more may be thrown out of the dental arch, which will be nearly or entirely filled without them; this is a very common form of irregularity of the canine teeth. The whole of the front teeth of both jaws may be so much crowded together that the crowns will deviate in almost every direction from a regular position; cases frequently occur in which the lateral surfaces of the incisor teeth present towards the lip. The lower incisor teeth may project beyond the range of those of the upper jaw instead of closing within them as they do naturally. But the varieties which occur are, as we have already said, innumerable."

"The principle upon which irregularities of this kind are corrected is, however, the same in all cases. The first indication is to obtain the necessary space to allow the irregular teeth to come into the arch; and then, by means of various mechanical appliances, to press them into their proper places. Directions for moving the teeth, after they have become fixed in their sockets, will strike those who have not thought of the subject, very strangely, and they may be disposed to think that it cannot be done without more or less injury. But up to the age of sixteen years, and in some cases even after that period, it may be done to considerable extent with ease and safety."

"The necessary space required for the correction of irregularities of this kind is generally obtained by the removal of one or more of the teeth, even though they should be perfectly sound. In the extraction of teeth for this purpose, and we now suppose that all the second teeth with the exception of the last molars have made their appearance, the bicuspids being the least important, should be chosen, unless some of the teeth near them are so much decayed that their preservation is impossible. Generally, the second should be taken instead of the first, but this will depend entirely upon the circumstances attendant upon each particular case. The cuspids are, perhaps, more subject to irregularity than any of the rest of the teeth, in consequence of the manner in which they are

thrown out of the arch, whilst the bicuspids are taking the place of the temporary molars; for it sometimes happens that the arch is almost entirely filled up before they make their appearance. These teeth should never be extracted when they are in such a situation that by removing the adjoining or second bicuspids they can be pressed into their proper places; and the instances are rare, if indeed they ever occur, in which this cannot be done. It is, also, very improper to extract any of the incisor teeth when they are much crowded, especially in young persons, as the loss of one of these teeth destroys the symmetry of the whole set, even if the space it occupied should entirely close up by the approximation of those adjoining."

"It is frequently the case, when the irregularity is not very great, and there is no obstacle in the way of their return, that the irregular teeth, after the requisite space has been obtained, aided by the constant pressure exerted by the lips from the outside, and the tongue from the inside of the mouth, will soon fall into their proper places. This, however, does not always happen, and we are compelled to resort to mechanical fixtures for the purpose of obviating obstructions, and to move gradually the deviating organs into a regular position. We cannot do more than describe the means which would be used in one or two special cases; the apparatus must, of course, vary with them. This will serve, however, to show the manner in which the object is effected."

"In a case where one of the lateral incisors is thrust out of the arch toward the inside of the mouth, the central incisor and eye-tooth nearly touching, one of the bicuspid teeth, either the second or first, according to circumstances, must be extracted. After the place from which it was taken has healed, the eye-tooth should be gradually moved back toward the remaining bicuspid, by inserting a thin wedge of paper between it and the irregular tooth, increasing it from day to day in thickness. It should be prevented from returning to its place by passing a ligature around it and the first grinding tooth. Although in this manner sufficient space will soon have been gained to afford room for the irregular tooth, it will generally be found to pass, when the mouth is closed, inside of the circle of the lower teeth. This, it will readily be seen, will be an insuperable obstacle to its coming forward, if left to itself, for the constant tendency of the lower teeth, every time they strike, is to press inward. The usual method of removing this difficulty, and of bringing the irregular tooth into its place, is to attach a bar of gold or silver to one of the first grinding teeth, on each side, and bring it forward in front of the incisors. At the place opposite the deviating tooth two holes are drilled, through which a ligature is passed, fixed around the tooth and drawn firmly. To prevent the teeth of the lower jaw from striking against the irregular tooth, a gold cap is fitted upon one of the molars, which will not allow the jaws to come quite together. The ligature is drawn tight, every day, until the tooth is moved sufficiently forward to strike on the outer surface of those of the lower jaw; at which time the whole apparatus may be removed, without fear that the tooth will fall back into its old position. This special case will serve to show the application of the principles upon which the correction of irregularities is founded; in the same manner those of the most unsightly description may be remedied."

"It may be well to state that few cases of irregularity of the incisor teeth

occur in which the extraction of a bicuspid tooth of one side of the mouth will be sufficient. By this, in many instances, the desired space may be obtained, but the tendency of the whole of the teeth, if the jaw be full, will be toward the vacant space, and it is easy to perceive that this would produce a deformity almost, if not quite, as bad as that caused by irregular teeth. But many cases occur in which it will be unnecessary to extract any of the teeth; all that is required being merely an apparatus fixed so as to throw out the whole of the teeth, thus giving the arch greater compass to admit the irregular teeth."

"3rd. The third cause of irregularity of the teeth is, as we have said, an improper direction given to them at the time they make their appearance; this may be confined to one or more, or may affect the whole of the incisor teeth of either or both jaws. In the case of the irregular lateral incisor mentioned above, it is seen that even after sufficient room was obtained by the extraction of one of the bicuspids, that it could not come forward, in consequence of the obstacle presented by the teeth of the lower jaw. In precisely the same manner may one or more of the upper incisors come out back of their regular place in the arch of the jaw, in consequence of the too long retention of the temporary teeth, or other causes, and be unable to come forward, even after the obstacles which first presented themselves have been removed—because, at every occlusion of the jaws, the teeth of the lower jaw strike against their external edges. This irregularity, which is a very serious one (for as the compass of the mouth is much reduced, indistinctness of articulation is caused), is corrected by attaching to the lower teeth plates of metal, so inclined as to strike against the inner surfaces of the upper teeth, thus constantly pressing the former inward at the same time that they force the latter outward. In this case, as in the other mentioned, the jaws must be kept from closing entirely by the use of a gold cap fitted to a molar tooth.

Nasmyth in "Researches on the Development, Structure and Diseases of the Teeth" (1845) stated that "Projecting upper jaw is often the result of a habit of sucking the tongue or finger in infancy. But both projecting upper and projecting lower jaw arise from an arrest of development in the jaw when expansion of the arch is deficient." He also states that the prominent mouth is found in uncivilized races.

James Robinson (1846) in "The Surgical, Mechanical and Medical Treatment of the Teeth," says, "There is no branch of the dental art on which there exists greater diversity of opinion than on the treatment of the irregularities of the second dentition."

According to Robinson the etiology of irregularities of the teeth are the early loss of the deciduous teeth, premature eruption of the permanent teeth, or extraction of the deciduous teeth.

If the permanent middle incisors of the lower jaw erupt in front of, or in back of the milk teeth, it is then advisable, he says, to extract the temporary incisors, and if the necessary room for the coming teeth is lacking, it is best to extract both, or, according to the circumstances, one of the incisors on the side. But this should be delayed until one is entirely convinced that the necessary expansion of the jaws has been procured. He also advises that the wisdom teeth be extracted where the teeth are in a crowded condition.

Robinson considers the prognosis of all cases of irregularities favorably, even at an advanced age.

Charles A. Du Bouchet (1847) in the "*Dental News Letter*," relates a case where the deciduous incisors were broken off close to the gum. The roots soon decaying, were extracted, leaving a vacancy in the middle of his upper dental arch, which was not filled by his permanent incisors until his fourteenth year. In the meantime the alveolar process became absorbed quite as much as in a subject far advanced in years, and formed anteriorly a deep cavity into which his upper lip sank, giving a peculiar expression to his features.

"To this apparent absorption and condensation of the alveolar process do I attribute the scattering and irregular growth of his second dentition, which likewise may be accounted for, by his being afflicted as I have stated."

"These irregular teeth, to the number of three, being all very much decayed, I extracted, as well as the left central incisor. The gums healed very promptly. At the present time, the anterior depression of the alveolar is entirely filled up, the gums have not shrunk, and his mouth is restored to a normal appearance as will be seen by looking at the cut, the two ill-shaped teeth in the median line grew in the place occupied by his deciduous central incisors, and were consequently an extra pair provided by nature to retrieve his early loss."

Samuel C. Harbert (1847) in his "*Practical Treatise on the Operation of Surgical and Mechanical Dentistry*," states: "Irregularities of the teeth are due to the premature extraction of the deciduous teeth and protrusion of the permanent before the absorption of a deciduous fang. A projection of the lower jaw is attributable to neglect in second dentition; generally it is supposed to be due to elongation of the jaw, which is almost always an error. When the dental arch becomes contracted at the medial line giving to the mouth a pointed appearance, it is often the result of premature extraction of certain of the temporary teeth.

Irregularity of the teeth.—"It is seldom that any disorder exists in the arrangement of the primary teeth, or is it a very important matter, as the early loss of these teeth, by natural causes, must take place before the evils of crowded teeth would be felt."

"The free, unobstructed state of the gums, prior to first dentition, offers no obstacle to the progress of the infant teeth, and they, consequently, emerge in a regular and symmetrical manner, while the second set, operated upon by different causes, are very frequently forced into a crowded and irregular group, a condition prejudicial to their appearance and health."

"The irregularities of the permanent teeth may be generally attributable to two principal causes,—the premature extraction of a deciduous tooth, by which an absorption of the parts takes place, and the adjoining teeth are brought in contact to the exclusion of a succeeding tooth; and the protrusion of a permanent tooth, before the absorption of the deciduous fang."

"The evil consequences of crowded or irregular teeth are so apparent to everyone as to demand every necessary care in the avoidance of it. There is no feature of the face more conspicuous than the mouth, upon the beauty and symmetrical form of which depends its grace and elegance. A very frequent deformity of the lower jaw, a projection occasioned by the lower teeth closing out-

side of the upper ones, is mainly attributable to neglect in the second dentition; generally it is supposed to be caused by natural elongation of the jaw, which is almost always an error, as the first is the principal and most frequent cause."

"The teeth most liable to derangement in their order, are the incisors and cuspidati of both jaws."

"The upper cuspidati often protrude above the crowns of the adjoining teeth, either upon the outside, by which they become a serious inconvenience in causing a prominence of the lip; or upon the inside, proving an obstacle to the tongue in its articulation."

"The upper teeth are sometimes found to incline with their cutting edges to the inside of the mouth, the opposite teeth closing outside of them. As this generally appears to be a natural disposition, it is more difficult of correction than any other kind of disorganization, and should be treated with hope of success in the early progression of those teeth."

"Another species of irregularity, by which the dental arch becomes contracted at the medial line, giving to the mouth a pointed appearance, is often the result of a premature extraction of certain of the temporary teeth, producing an undue absorption before the advancement of the permanent ones; thus confining them to a less space than they should occupy, and crowding them into an elliptical form instead of the regular circle."

"To avoid the evils of crowded and irregular teeth, proper care should be exercised in maintaining the health of the primary set to keep them from decay and the necessity of extraction before the proper time for their moulding and succession of the permanent teeth."

"The mouth should continue to be examined, during the whole course of second dentition at frequent intervals and the peculiar characteristics explained to the child's parent or guardian that they may be able to guard against the causes that operate in producing irregularity."

Treatment of Irregularity.—"The teeth may be altered in their relative positions to each other by a proper course of treatment. Any required change should be made before the patient exceeds fourteen or fifteen years of age; after that time the probabilities are against success, though not without hope. I have succeeded in correcting a very prominent deformity in the teeth of individuals several years older."

"If the dental surgeon is consulted before the entire completion of the second denture, and any of the deciduous teeth remain in opposition to a regularity in the advancement of teeth belonging to the second set, he should at once extract the opposing tooth. It is frequently necessary to remove more than one—the permanent tooth being larger than the temporary one, requires more room. In every case where the extraction of a second tooth is considered necessary, the one posterior situated should be preferred as it gives an opportunity for the teeth to spread, and a consequent enlargement of the dental circle. If, as is frequently the case, the whole course of dentition has been allowed to proceed unassisted, and the teeth, instead of presenting a systematic arch, appear in a confused mass, he must then use mechanical means to remedy the neglect."

"If the upper teeth, or a portion of them strike inside of the lower ones on the occlusion of the jaws, it may, when only partially so, be overcome by direct-

ing the patient to use a piece of ivory, flat on both sides, and held by one end, with the other resting upon the anterior side of the lower and posterior side of the upper teeth, and closing the jaws whilst held in that position, but as it is difficult to ensure a constant practice of it, a more certain and convenient recourse should be had."

"I have, with universal success, substituted a metallic regulator acting upon the same principle. By obtaining a cast of the mouth, a plate is made to fit the posterior side of the teeth, with the end clasping a molar on each side of the teeth. Upon the clasps a cap is soldered to fit the teeth on their grinding surfaces, which, meeting those of the opposite jaw, prevent their entire occlusion. Another piece is also soldered to it to cover the cutting edges of the teeth that are to be corrected, and inclining in a position the same as would be given by the ivory. A very short time will suffice to change the relative position of the teeth. After they alter enough to allow them to close naturally the regulator may be removed, the power of the jaw being sufficient to force the teeth into their proper place, when once they have received the necessary inclination."

"When the front incisors are situated with their central edges turned out, it is generally occasioned by a contraction of the jaw, and an insufficient amount of room for the necessary number of teeth; the only remedy is to extract the first bicuspids of each side; the other teeth will gradually fall back until the spaces occupied by the teeth that have been removed are filled up; and the irregular incisors will regain their proper situation."

"It has been a common practice when the lateral incisors are crowded out to extract them, thus bringing the cuspidati forward to occupy their places, though in a line with the front teeth; the error of this practice would appear evident to anyone, could he see the result. The same mode of treatment suggested to correct a prominence of the centrals should be resorted to in this case."

"A protrusion of the eye teeth above the crowns of the adjoining ones may be remedied by the extraction of the second bicuspids; if the first one be decayed or deranged in its position, or from any sufficient cause, it may be preferred to the second; but in the absence of a particular motive a choice should be given to the drawing of the second bicuspid."

"When these teeth are thrown entirely from the dental circle and are shut from sight upon the closing of the jaws, but little prospect can appear of bringing them out to their proper place. The operator must judge, from the circumstance of the case, the practicability of extracting a bicuspid, and by the aid of ligatures to the adjoining teeth forcing the tooth into the circle, or an extraction of the errant member; if the first expedient is adapted, it will be necessary to obviate the pressure of the opposite teeth as already recommended."

"To correct an unnatural occlusion of the front teeth, is the most difficult of all defects to remedy. The only way by which I have ever been able to effect an alteration has been by resisting the pressure of the jaws and preventing the teeth from coming in contact, and by removing the lateral bearing of one tooth, against another; the first is to be accomplished by inserting caps upon a molar tooth of each side stamped between a die and lead, to make them fit accurately. The second by extracting a bicuspid from each side; after which, by a constant pressure exerted upon the posterior edge of the front teeth, they may

be ultimately forced out, until they close outside of the lower teeth; an apparatus such as described, modified to suit the peculiarities of the case, might be used to advantage."

"Of the many practices suggested for the correction of irregularity, that recommended by Mr. Bell, of filing the teeth to obtain space, is the most to be deprecated. Ligatures are also objectionable, as the silk or thread used is liable to force its way upon the neck of the tooth and under the gum, producing inflammation and injury to the parts."

(To be continued.)

Boil It Down

IN too many articles printed in dental journals, the effort seems to be to pad with verbiage. One of the great sins of writers, if not the cardinal sin itself, is to employ more words than are necessary to tell the story. This is an age of concentration and condensation, and the man who wants his articles to be read must learn to eliminate the superfluous. It is the short, crisp, trimmed-to-the-minute article that appeals to the modern reader; the article that goes straight to the core of the subject and digs out the essential facts, leaving the introduction and peroration to the imagination. Some articles have so much introduction, and such a never-ending conclusion that if the reader wades through all of it he has lost sight of the real essence for which the article was supposed to be written.

And strangely enough in many instances the verbal excursions in which writers indulge have little relation to the subject being discussed. There is a tendency to ramble, to go off into the by-ways of the subject rather than stick to the main thoroughfare. All of this tends to obscure the meaning which the author wishes to convey, and thereby to weaken the force of his argument. It is safe to say that most articles published in our journals would be greatly strengthened by being "boiled down." We once heard a man who is himself a very prolific writer make the statement that no paper written for a dental society should be longer than 3,500 words. We think that there are exceptions to this, and that some topics under certain conditions will require a longer treatment than this for their proper elucidation, and yet in the main we believe he was right. The very best paper will become tiresome if it is too long, and what is tiresome to listen to will likely be tiresome to read.

A good plan for a writer is to think intensely on his subject before committing anything to paper. Let him make headings of the various points which he wishes to bring out, and then when all is formulated let him put it on paper. After it is written let him lay it aside for at least a week—better a month. Then he should deliberately revise the paper and see how much useless writing he can eliminate from it. It will usually be found that after the first flush of composition is over many irrelevant passages can be taken out to the great improvement of the paper. A writer owes it to his readers that what he presents for their consideration shall be in the very best form, and while many men who have excellent ideas do not find it easy to express them on paper, yet most of those who write for dental journals can greatly improve their product by a general process of "boiling down."—*The Dental Review*.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

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CLINICAL AND RADIOGRAPHIC EVIDENCE THAT CROWN AND BRIDGE-WORK IS A MENACE

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THE method of dental restoration with its many faults and fewer virtues which is upon this occasion our privilege to discuss is generally considered in the light of a relatively modern addition to the prosthetic department of dental surgery, and the present status of the art of replacing lost teeth, or portions of them by means of the system known as crown and bridge-work, we frequently regard, with no mean degree of pride, as a reflection of the course in the ascendancy which dentistry has been so assiduously following in the past decades. A closer investigation, however, into its history will reveal the astounding fact that crowns and bridge-work of the present day had its origin in antiquity and that while its technic has since undergone a progressive evolution in point of the numbers of teeth saved or the numbers of teeth substituted, with physiologic permanency, the system has, we believe, almost entirely failed.

The first formal arraignment of this method, which the dental profession was loathe to endorse, is to be found in the initial article of the series on oral sepsis, by Dr. William Hunter of the Charing Cross Hospital of London. This analytical writer's seemingly strong and at the time unwarranted indictment of crown and bridge-work appears now, after a detailed investigation covering a period of several years, as a decidedly conservative condemnation of the method, for while it may have been the source of temporary comfort to some patients it has on the other hand silently undermined a number of lives at present well-nigh impossible to compute.

The insertion of crowns that are to play the part of supports for bridges is closely associated with the question of whether or not such abutment teeth should be deprived of their pulps. While practitioners have at no time found it logical to accept without qualification either side of the proposition, but have decided the matter on the basis of the personal judgment of existing conditions, the results in a multitude of cases have been far from satisfactory. These cases which for purposes of elucidation we may designate as "the frank infections" have not, however, meant anywhere near the injury to the general health which the hidden type has been responsible for, ever since the widespread employment of crown and bridge-work. The removal of the pulp prior to crowning vital teeth

has been chosen as the lesser of two evils, as the means of forestalling its disorganization and death subsequent to the completion of the crowning or bridging operation, basing this preventive procedure on the clinical evidence gathered through decades of observation on the ultimate fate of pulps under gold-shell crowns. It has been a case of anticipating by mechanical and therapeutic means the complications accompanying death of a pulp, heralded or not by symptoms indicative of the pathologic changes occurring within its substance. How successful our efforts in this direction have been is a phase of the series of questions we will consider at this time, with the view of adding to the possibilities of a future solution of the problem.

Crown and bridge-work, of course, differs from other prosthetic devices in that even when not constructed with the utmost regard to accuracy of adaptation, it apparently continues to serve its purpose for months if not years, but then, in most cases, at a cost to the wearer to be measured not alone by the loss of the anchor teeth, by impairment of the functions of the neighboring teeth, by unbalanced masticatory movements, but by infectious inflammatory phenomena in its alveolo-dental articulation and soft tissues of the mouth, the starting point of disturbances in the thoracic, abdominal and pelvic viscera, in articular and muscular tissues and in the composition of the blood, which not infrequently terminate in an untimely grave. The fixed character of crowns and bridge-work with the so-called self-cleansing spaces, self-retainers of bacterial pabulum, is responsible for more cases of pericemental infection, than any combination of causes which suggests itself at this time.

Crowns, whether gold-shell or Richmond, involving in the latter case extirpation of the pulp, and in the former case the same procedure either as a measure of necessity, or one of prevention, demand close scrutiny at this time with the view of recording such observations as it has been in our province to make affecting the ultimate result of root-canal operations.

With the advent of the x-ray the element of doubt heretofore so conspicuous in this type of operations, in their diagnosis and post-operative phases, has been almost entirely eliminated and we are today in the fortunate position of being able to discern with clearness most of the conditions which follow the removal of a pulp, and the obliteration of the space in which it was housed by such means as are at the command of every dental practitioner.

We shall now enter upon a consideration of those features in crown and bridge-work which are an integral part of the mechanism of substitution, and which play so significant a role, directly in the etiology of mouth diseases, and indirectly in that of systemic manifestations. We cannot undertake this task without first recalling to your minds the distribution of the most important tufts of pericemental fibers, in order to more clearly bring out the fact that the slightest interference with the marginal gingivæ results in degrees of not only marginal gingivitis, but likewise of marginal pericementitis. As bearing upon this aspect of the question, permit us to mention only those groups of fibers which are distributed to the gingivæ and septal tissues, and which run from the pericemental membrane to the unattached gingivæ and to the tissues which normally fill up the interproximal space. Any degree of impingement upon the free gingivæ or the septal tissues must and does result in a peripheral gingivitis and

also in a peripheral pericementitis. The cervical edge of a crown is usually constructed so as to reach either way below the free gingivæ, slightly below or just in apposition to it. When made to reach for a distance under the free gingivæ it induces a degree of irritation which soon leads to chronic inflammation of the investing tissues. When made to reach slightly under or when it just merely touches the gingival edge, the degree of irritation which it causes leads to a slowly developing inflammation, but as in the previous case marks the onset of more deeply seated gingivitis and pericementitis, the precursors of extra-osseous focal infections. The edge of a crown—or should we not say edges of most crowns—act in their disease-producing capacity in two ways—by inducing a purely mechanical irritation, the antecedent of an infectious inflammation and by the retention which they make possible of food particles which, when they undergo fermentation or putrefaction, as the case may be, give rise to end



Fig. 1.

products, acid or alkaline, which further intensify the inflammatory process. In the construction of individual or assembled crowns any factor which makes possible the interference with the physiologic functions of the gingivæ and septic tissues is the precursor of gingival or pericemental diseases and so far basing our conclusions on our own clinical experience and that of many other co-workers, the percentage of crowns and bridges which do not set up chronic inflammations in these areas, by primarily interfering mechanically with their vitality, is so appallingly small as to render unnecessary any attempt at arithmetical accuracy.

Kindly bear in mind that the incidence of an inflammation in the septal or gingival tissues is the beginning of a chain of reactions to bacterial and chemical irritations which results in time in the invalidism and loss of the abutment teeth and that which is by far worse, namely, the extra-osseous areas of bacterial and

toxin absorption which preceded their exfoliation and which following a silent and evasive course not infrequently clutch the victim in the antennæ of unrecoverable disease. An important observation we have so far made is that some of the most marked systemic manifestations which develop from focal infections in the jaws which it has been our privilege to study, have been in patients in whom these pathologic conditions in crowned teeth gave rise to absolutely no



Fig. 2.

symptom in the mouth, either subjective or objective, and were discovered accidentally or following an effort at diagnosis by elimination of some obscure deep-seated disorder. For instance:

CASE-REPORT NO. I.

Young woman, aged about thirty-five, has been for years the sufferer from gastric and intestinal insufficiency. She related no sense of discomfort in the mouth. Her appearance was extremely toxic; she felt draggy and had lost most of the ambition normal to a person of her age and surroundings. In the effort to discover the causative factors of the unsatisfactory state of her health, everything else having been eliminated, she was referred to us. A focus of infection under a crowned lower first molar was found, which had at no time given the slightest evidence of its existence (Fig. 1).

CASE-REPORT NO. II.

Man aged about thirty-five, had been in excellent health up to the time of the insertion of a crown on a lower first molar. Since then his health has been impaired; it had been gradually becoming worse until a few months ago when he exhibited symptoms of chronic endocarditis. This man at no time had any symptoms that could have been interpreted by any stretch of the imagination as the manifestation of disease in or around the teeth. This radiograph was made in the course of our investigations on the condition of crowned teeth. It will be observed (see Fig. 2) that a decidedly well-marked focal area exists between and around the mesial and distal roots, and that the infectious process has

spread so as to involve the distal side of the root of the second bicuspid. It appears that since the proper dental treatment was instituted, the patient's health has been gradually improving.

CASE-REPORT NO. III.

While no history is obtainable concerning this case, we do know, however, that the patient was in utter ignorance of the continuous infectious process going on about the root of the lower first bicuspid which had carried a gold shell crown for years (see Fig. 3).

CASE-REPORT NO. IV.

This patient complained of pain in the mandible. Upon radiographic examination nothing abnormal could be detected in the area suspected by the patient, but two well-defined focal areas are to be seen upon the upper bicuspid teeth upon the side where the pain was manifest. Both of the affected teeth carry crowns (see Fig. 4).



Fig. 3.

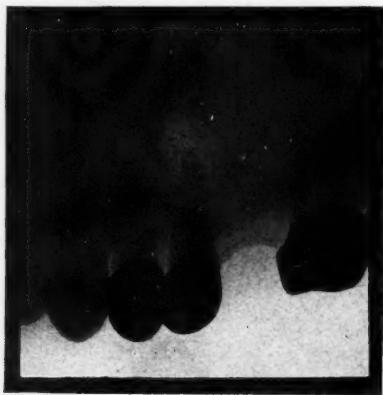


Fig. 4.

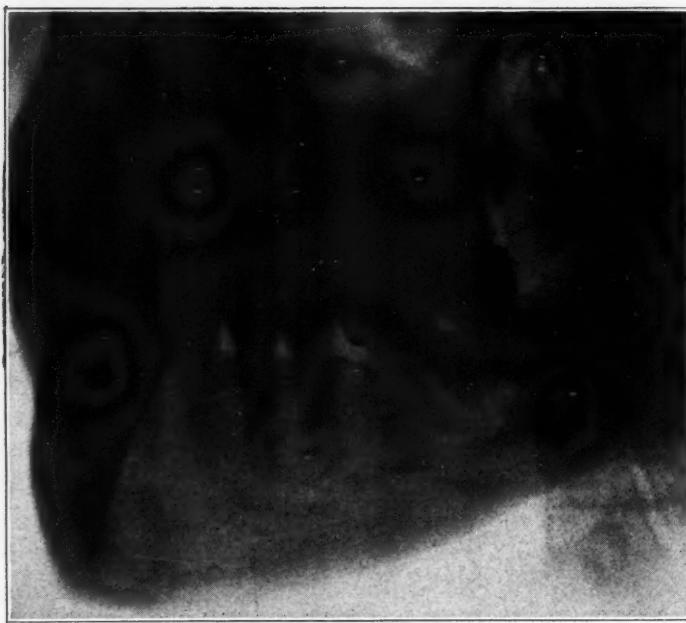


Fig. 5.

CASE-REPORT NO. V.

The history of this case is of unusual interest. No painful symptoms at any time; no discomfort in any part of the mouth. Upon examination a focal area was detected

between and about the roots of a crowned lower first molar (see Fig. 5). This patient for some time had been a sufferer from rectal abscesses, which were most unresponsive even to surgical treatment. The treatment of the tooth has resulted in an amelioration of his general condition, including the infectious process in the rectum.

CASE-REPORT NO. VI.

Here again a marked infectious process is going on in the area of the roots of the upper central and lateral incisors producing no objective or subjective symptoms whatsoever (see Fig. 6).

CASE-REPORT NO. VII.

The lower molar had been supplied with a crown which the patient was wearing temporarily as it was to have been used as one of the piers for a bridge (see Fig. 7). This patient complained of some very slight discomfort in the molar. If the x-ray had not come to the dentist's and patient's assistance, doubtless the operation would have been completed and the bridge would have been cemented in. The radiograph shows a very large focal infection and one which no therapeutic means of any kind could possibly eradicate. This is strictly a surgical case.



Fig. 6.



Fig. 7.

In addition to the two disease-producing factors already discussed, i.e., root-canal operations and impingement upon the gingival and septal tissues, that is to say upon the areas of distribution of the extra-alveolar pericemental fibers, by the cervical edges of shell crowns and banded pivot crowns, there still remains

to be considered the deleterious effects upon the soft tissues of the mouth of retained food debris and the action and effect upon the dento-alveolar articulation of the artificial ankylosis caused by a piece of fixed bridge-work. That all forms of full dummied fixed bridge-work are filthy, we believe no one would attempt to gainsay with the expectation of successfully contradicting the proposition. At least we have never seen one of the class specified that could be designated by any less a forcible term. The results of the decomposition of retained food particles admixed with mucin, continuously plays the part of a predisposing cause of more deeply seated inflammations of those soft tissues with which portions of the bridge are in constant contact. These deep-seated cases of gingivitis by a process of continuity not infrequently assume alarming proportions. The following case came under the writer's observation in the spring of 1914. A man aged about sixty had been for at least ten years prior to our examination of his mouth the wearer of a number of pieces of bridge-work. He consulted us in regard to a severe type of inflammation of the soft tissues under a form of saddle bridge anchored to the lower cupid and first bicuspid and supporting two artificial molars. The soft tissues which were markedly swollen and exquisitely painful would not respond to any such treatment as did not involve the removal of the piece. The patient was extremely toxic and his digestion had been, as he explained, very poor for many years. To this (the removal of the piece) the patient did not at first assent; and when he finally decided to avail himself of our advice he was then in the grip of a series of symptoms strongly simulating those of cerebrospinal meningitis. The patient eventually recovered but only after a siege of several weeks of confinement to his room under the care of two physicians and several nurses. His health has improved wonderfully, the gastric symptoms having disappeared. We doubt not that had he consented at the outset to rid his mouth of all the sources of constant irritation and infection, the seriousness of the situation would have been averted.

The last proposition upon which we must ask to focus your attention is the one which has to do with atrophic changes in the pericemental fibers following the fixation of the alveolo-dental articulation by bridge-work of the permanent type. The periodontal membrane through the agency of its intra-alveolar fibers exhibits among many other functions that of enabling the tooth to have a certain degree of play in its socket, in the course of masticatory movements. In other words, in addition to acting as the retaining medium of the tooth in its alveolus, the fibers are almost constantly functioning, displaying that degree of elasticity, thanks to which the pulp is not jarred out of existence. The fixation of the joint brings about atrophic changes in these fibers which either completely disappear or become weak links in the chain of resistance to bacterial invasion. A fixed piece of bridge-work destroys the slight movement of a tooth in its socket. It first produces an ankylosis and eventually the atrophy of the affected fibers.

The cases here reported represent, in our judgment, the pathologic conditions usually found associated with both individual and assembled crowns. They do not represent exceptions taken from a long series of cases selected for the purpose of substantiating the statements herein advanced. They typify the conditions most frequently encountered in private and infirmary practice and the story they tell, a narrative of physical inability, mental anxiety and lost ambi-

tion, is precisely the purport of this message,—an appeal for any form of prosthetic dentistry which does not spell ultimate invalidism to those who through neglect of dental diseases have to avail themselves of it. Indirectly, please interpret our remarks as an urgent entreaty for the conservation of the dental pulp, not perhaps so much for the sake of maintaining the vitality of the dentin, but because its disappearance through disease or to subserve prosthetic purposes carries with it complications of so serious a nature as to warrant the statement that the loss of a pulp through any cause, marks a tragic epoch in the individual's existence.

REPORT OF A CASE OF DENTIGEROUS CYST OF THE MANDIBLE IN WHICH THE X-RAY PROVED OF GREAT VALUE

By E. F. THOLEN, M.D., D.D.S., LOS ANGELES, CAL.

W. E. Age 16. Male.

History.—Two years ago noticed pain and swelling over center of lower jaw. This was incised through the mouth and drained. Pus obtained. Symptoms subsided after six days. Patient stated that radiograph made at that time showed nothing abnormal. The same condition has recurred twice. The lower centrals and laterals have always been sensitive and at times quite loose.



Fig. 1.—Radiograph showing the extent of the cyst on the left side of the median line.

The last attack began January 26, with pain, tenderness, temperature and swelling of anterior third of lower jaw. It was lanced through the mouth two days later, and an offensive pus obtained. Five days later I saw the patient. Ex-

amination showed bulging of the lingual plate of the mandible, crowding the tongue backwards and interfering with speech. There were no signs of an acute inflammation. The centrals and laterals were displaced forward, quite loose, tender to pressure, and sensitive to cold. There was an incised wound in the labial fold that discharged a yellowish watery fluid. Probing wound led to normal bone. The soft tissues over the mental region were infiltrated. The external surface of the mandible appeared normal. Radiograph shows a cyst extending from bicuspid to bicuspid involving the entire thickness of the mandible from the alveolus to the lower border. The roots of the laterals and centrals were in the cyst. (See Figs. 1 and 2.)



Fig. 2.—The extent of the cyst on the right side of the median line is here shown.

Treatment.—The lower centrals and laterals were extracted and an incision made distally and lingually from sockets to the first bicuspids. The lingual mucoperiosteum was elevated and the underlying wall removed with chisel and biting forceps. The anterior wall of the cyst was left intact and made flush with surrounding mandible. The wound was packed. The patient made an excellent recovery.

Examination of the cyst wall showed it to be made up of dense connective tissue and lined by a layer of squamous epithelium which was infiltrated with small round cells.

CURRENT ORTHODONTIC LITERATURE

EDITED BY H. C. POLLOCK, D.D.S.

The Bodily Movement of Teeth in Orthodontia

IN a paper read before the European Orthodontia Society at its seventh annual meeting in Paris in August of 1914 (*Dental Cosmos*, July, 1916), Dr. Calvan S. Case, of Chicago, takes up in detail the question of the bodily movement of the teeth. Art in orthodontia, contour apparatus, the Angle apparatus, the history of the bodily movement of teeth, bone movement and interstitial development, bodily protrusion of the lower front teeth, bodily mesio-distal movement of the buccal teeth, and retention are each thoroughly discussed in this admirable essay. Cases are shown and illustrated in which the bodily movement of teeth are necessary and decidedly indicated. Dr. Case presents the final facial casts showing the artistic effects of bodily movement which has carried the alveolar and intermaxillary processes forward together with considerable development of bony structure, thereby correcting the facial lines, and contours of the upper lip and nose.

In regard to "Art in Orthodontia," Case says that "the highest aim in orthodontia has been to place the teeth of every patient in normal occlusion, accomplished mainly by an inclination of the crowns, and too frequently in cases which demanded a bodily movement. This has been done with the almost blind belief in the teaching that the developing forces would ultimately move the roots and alveolar processes, and even the entire facial outlines, to normal relations with the crowns, and that consequently the best possible results would be ultimately attained. It has taken a good many years of clinical experience and observation for the many to realize the futility of this teaching. Not but that it always will be, and should be, our highest aim to place the teeth in normal occlusion, when this can be accomplished without producing a facial deformity. But there is another side, in addition to the mechanical and physiologic usefulness and utility of the dentures, which has been growing and developing through the influence and the natural processes of our occupation. It is the artistic side of our temperaments, with its important relations to the practice of our specialty. To be sure, some possess this quality to a greater degree than others, yet no one could become an artist of any note without its cultivation and higher development. Orthodontia in its highest sense is art, and orthodontists who practice their specialty as they should are artists—and in one sense to a far higher degree than sculptors and painters; for their work is to bring harmony and beauty to living forms—to the human face, which has had more to do with the battles and emotions of life than any other one subject. Moreover, their field of labor is that area of the face in which lies its greatest attractiveness if perfect, but which may be a source of its greatest repulsion if imperfect."

"By this it will be seen that the art side of dental and dento-facial orthopedia is one of the most important basic factors of this specialty, because it not

only pertains to the appearance of the teeth in talking and laughing, their harmony of position, alignment, and occlusion, but it also imperatively relates to the facial outlines whose imperfections in repose and motion are marred or beautified by the underlying framework, told in the lights and shadows of facial contours. It is through a cultivation of the artistic side of our temperaments that an increasing desire awakens in us to accomplish the most pleasing results. It is this which is leading us to a closer observation and appreciation of the beautiful, and to a fuller realization of that well-established scientific truth, that nature does not 'start out with each individual to build according to a predetermined plan of harmony,' but builds exactly that which is forced upon her by the inexorable laws of heredity and variation. Moreover, it was the artistic desire to correct certain dento-facial deformities, and some of nature's inharmonies, which, over twenty years ago, was the mother of the idea of the principle of bodily movement of teeth. It matters not what methods are employed to verify the truth of this great principle and its artistic and physiologic accomplishments, whether it be by methods which have proved so successful in my hands and in the hands of others for the past twenty years, or by the more recent method introduced by Dr. Angle or by those of Dr. Jackson and others. What really counts is that a greater number of world's sufferers will be benefited, and the principles of dental and dento-facial orthopedia will have progressed."

In regard to the new Angle apparatus for the bodily movement of teeth, Dr. Case says "it would hardly become me to criticize it in any way—never as yet having employed it—but I expect to improve an early opportunity to try out the effectiveness of this spring torsion force. I am inclined to believe that no unprejudiced advanced orthodontist can ever have the slightest objection to the faithful trying of any method which is claimed to be successfully employed by others; nor will he refrain from taking advantage of every principle which seems to be along the lines of advancement, from whatever source. I do not mean that we will try the Angle apparatus as many have claimed that they have tried to construct and employ the contouring apparatus—possibly once—and found it wanting; just as they have tried to construct and apply our retaining appliances—once. Apparatus which demands real mechanical skill and a high order of judgment to construct and apply, cannot be truthfully judged as to its efficacy and use except through many trials. Appliances which seem to be the most complicated and difficult to construct are often found to be no more difficult than others, when one gets into the systematic run of their construction and employment; moreover, they are commonly the ones which require the least time and attention after being properly placed, and they usually produce the least pain and annoyance to patients.

"This is eminently true of the protruding contour apparatus. When once it is properly constructed and placed, the work goes forward to its completion surely and truly, with the least possible annoyance to everyone concerned. In fact, no apparatus that we employ occasions so little trouble from the beginning to the end, every move being perfectly under the control of the operator and mostly by the simple turning of two or more nuts. In the main, these sayings may be true of the Angle apparatus, though at the present writing

it has hardly had sufficient time or employment in extensive movements to establish its full clinical value from a scientific standpoint. I sincerely hope it will do all that is claimed for it, and that it will continue to occupy an important place in orthodontia. It certainly is far and away in advance of the expansion arch with its numberless wire ligatures and wire bands, and will be more so when clamp-bands are exchanged for sensible stationary anchorages with rootwise extensions. But I can very well understand how, if it is properly constructed and accurately adjusted, it will be effective in the correction of a large proportion of general minor cases, and perhaps in all cases for young children whose alveolar processes readily yield to comparatively mild continuous force. No one would believe, without experience, what can be accomplished with those light intermaxillary elastic rings."

For the more difficult operations, however, especially for those older than ten or twelve years of age, requiring extensive bodily movement in cases of decided retrusions and protrusions of the roots of front teeth, often accompanied with marked dento-facial deformities, no method, in my opinion, can ever equal the contouring apparatus, which is founded upon well-established principles of mechanics. It is therefore a great pleasure to me and to others who have witnessed the wonderful results of the extensive employment of this apparatus for so many years, that now, under the stimulating influence of this enthusiastic acceptance of the great principle of bodily movement of teeth, this apparatus is surely on its way to the hands of many skilled men who will be, and will *continue* to be, just as enthusiastic over its possibilities and results as we are.

In discussing the history of the bodily movement of teeth with this apparatus, Case says: "The first case in which these principles were applied was begun in the early part of 1892, and published with the completed case in a paper illustrated with facial and dental plaster casts, appliances, and drawings, read before the February, 1893, meeting of the Chicago Dental Society. It was in connection with this case that the *disto-mesial action of intermaxillary force* was first introduced. While the apparatus which was constructed for this case was very crude compared to subsequent ones, yet the success with which I was enabled to produce a bodily protruding movement of the upper front teeth and seemingly the entire intermaxillary process, even to straightening the nose, was hardly believable even by myself. In the discussion of the paper, Dr. G. V. Black, who seemed somewhat skeptical of the possibilities which the facial casts showed, was kind enough to laud the ingenuity and practicability of the intermaxillary force, and was the first man in the world to mention its probable disto-mesial action in adjusting the occlusion. If I remember rightly, he said that elastics placed in the manner shown on the mounted model exhibited would move the teeth of one jaw back and the teeth of the other jaw forward, and thus when necessary the dentures could be placed in normal occlusion. I regret that Dr. Black's remarks at that time were not published in full. While the action of the intermaxillary elastics was probably the main force which corrected the occlusion in this case, I employed it primarily to retrude the lower front teeth to proper occlusal positions after extracting the bicuspids, and to reinforce the stability of the upper anchorages; and immediately after this meeting, both Dr.

A. E. Matteson, of Chicago, and myself commenced the employment of these elastics for the disto-mesial adjustment of occlusion.

At the meeting of the International Congress in August, 1893, the above case, with two others which had been completed, was presented, fully illustrated and described. From that time up to the present the practicability of this principle of applying force for the bodily movement of teeth, verified by the remarkable artistic dento-facial results that were accomplished in numerous cases, has been presented before all the leading dental societies which have met in America, and once in this city at the International Congress of 1900."

"In a discussion of a paper which I read at Detroit in 1895, before the Tri-State Dental Society, and which was illustrated with many dental and facial casts, our beloved and lamented Dr. George H. Cushing made the following remarks: 'If there are any objections now to the possibility of moving the teeth *en phalanx* bodily they must fall before the positive evidence of clinical observation. Two of these cases I have seen under treatment from the first. I cannot begin to tell you the extent of the improvement in the facial expression. The maxillary bone and the process were so receded that there were depressions each side of the median line so deep you could lay your finger in them. Those are now very nearly two-thirds obliterated, I should think; and though this mask shows a wonderful improvement, it does not show fully the great change which has been effected.'"

In speaking of retention, Dr. Case has the following to say: "One of the most important, if not the most important branch of orthodontia, is permanent retention. This particularly applies to retention after a bodily movement of the front teeth. Moreover I wish to emphatically assert from the standpoint of an extensive experience that no movement of the teeth demands so great an amount of stability in the retainers as an extensive bodily movement of the front teeth, *en phalanx*, whether upper or lower. Nor is there any movement which demands that the retainers remain upon the teeth such a length of time. As the Angle apparatus was originally intended as a working retainer, there is no reason to think it will not retain the teeth it has moved. It will doubtless require great nicety of judgment to determine just how much force the spring arms must exert in order to prevent the roots from returning, and at the same time not to exert sufficient force to continue the regulating movement. The same is true of intermaxillary elastics when employed to aid retention. But as I understand that the Angle bow can be easily removed, the forces upon the different teeth can from time to time be readjusted according to their needs. That, however, is not the great objection to employing this apparatus for a retainer. It is the same objection that obtains in employing the contouring apparatus for a retainer. One is quite as conspicuous as the other, and this is a very great objection when one considers that, for patients more than eight or ten years of age, bodily labial movements of the front teeth should be retained at least two years. Nor does the objection stop here. Patients who have undergone the tedious operation of regulating, extending over a period of one to two years, during which time the teeth are at least brought to a position of perfect correction, would decidedly object, and especially the parents, if they were told that

they must continue to wear the contouring apparatus, or any other regulating apparatus, for the two years more.

"The retaining appliance which I have extensively and successfully employed for the last eighteen years is not much more unpleasantly conspicuous than the ordinary gold or platinum fillings between the front teeth, except the bands around the canines, which are now made quite narrow in front and fitted close to the gingival borders. This appliance is supplemented for bodily movement with rigidly attached lingual bars; or tubes for No. 17 iridio-platinum bars which extend to open tubes on the molars—the ends being threaded for nuts to act in the desired direction. When this appliance is cemented on the teeth, whose roots have been moved labially, the ends of the bars are raised to a position even with the occlusal surfaces of the molars, and as soon as the cement has hardened they are sprung gingivally into the open tubes, which are closed around them. It will be seen that this exerts a spring force upon the roots of the front teeth in the direction of their original movement, and which at any time can be increased with the curved bending pliers. For many bodily movements of the front teeth *en phalanx*, especially for children, I have for years advocated the employment of this apparatus for not only a working retainer, 'but one which could be made to exert a similar—though less powerful—force to that of the regular contour apparatus. Because of its inconspicuousness it may be preferably employed from the start in minor bodily protruding movements of the incisors. In all cases where it seems desirable to remove the regulating apparatus before the full completion of its work, this character of retainer will be found invaluable for holding the position gained, and for continuing the movement.' I cannot see why it cannot be made to exert fully as much force, and of quite the same character, as the Angle apparatus. It certainly would have the very great advantage of inconspicuousness.

"There has recently arisen a cry against the stationary method of retention, claiming that it debars development, bone-growth, etc. It is of the same source and character as objections which debarred for so many years the general acceptance of bodily movement. That came from men who had never had any experience in bodily movements, just as this objection now comes from men who have had absolutely no experience whatever in this method of retention. Is it possible that an extensive and practical experience of nearly twenty years, during which time almost every case regulated by myself and others has been retained in this way, shall count for nothing against visionary theories backed up by no practical knowledge or experience? I defy any man to point out a single case of mine to others which has worn the six-band stationary retainers that were properly constructed and taken care of for two years or more, which has suffered the slightest deleterious effects, or any indication of an inhibition of development, etc. On the contrary, this method of retention has given the very highest satisfaction to everyone concerned. As I said as long as ten years ago: 'If I were deprived of its benefits I would quit the practice of orthodontia.' Moreover, in regard to the theoretic objections to its holding the teeth immovably, let me say that it would be *impossible* to hold teeth absolutely still with any appliance, though they might not perceptibly move in their relations to each other. The forces of mastication while in action would keep up a constant move-

ment of the roots in their sockets. There is only one drawback to its general employment, and that is: It demands the most exacting mechanical workmanship and good judgment for its proper construction. No more, however, if as much, as the recent Angle apparatus. Nor should that requisite be considered a valid objection to the employment of either of these appliances, nor of anything else in dentistry which skillful men successfully construct and employ, and which enables them to attain a desired object."

Further Evidence as to the Influence of the Forces of Occlusion in the Development of the Bones of the Skull

THIS subject is discussed by Lawrence W. Baker (*Items of Interest*, July, 1916), being a continuation of former work done by this writer in which he has shown the tremendous influence exerted by occlusal forces upon the development of the skull. The experiments were conducted in the Research Department of the Harvard Dental School. Regarding the experiments, Baker says:

"The experiments on which this paper is based and those which I have at present under way make me believe that the reaction of these occlusal forces on the skull are based on as definite laws as are the forces of occlusion themselves; furthermore, I believe that in these reactions are locked the secrets of a normal skull; for if a group of forces acts in accordance with the body laws, why should not the reaction of these forces be governed by just as definite laws as are the forces themselves. . . . There are several other matters worthy of consideration; for example, note the area of this muscular mass (including the tongue), as compared with the whole head. It will be observed that it ranks well in size with the other structures or organs of this most compact, intricate and wonderful part of the human body. It is evident to me that Nature never would have devoted so much important space to this group of muscles if it were not for the benefit of the head as a whole. According to the laws of evolution, the functional activity of such a mass of muscular tissue cannot but have a direct and powerful influence in shaping the bones to which they are attached. Furthermore, the great supply of pure blood that the vigorous activity of these muscles demands not only rushes to these muscles, but also to other parts of the head, and it seems no more than logical to believe that the brain itself shares in this increased blood supply. The idea of muscular activity and increased circulation to the adjacent parts is a well-known fact. Dr. Campbell, in his remarkable series of papers laid great emphasis on this matter."

"It occurred to me that if my hypotheses regarding the influence of the dental equipment on the formation of the bones of the head were correct, interference with the laws of occlusion in the lower animals would show consequent effects in the formation of the bones of the skull; and if variation occurred it might throw some light on the most complex problem of the development of the human head."

To test this theory, the following experiment was performed: A litter of four rabbits was selected at the age of weaning. One of the rabbits was chloroformed, and the skull procured shows considerable deviation as a result of the

lost occlusion on one side. Dr. Baker shows many deviations of the skull taken at various ages as a result of the occlusion having been destroyed.

In experiments of the same character upon sheep, animals of the same birth were selected for the test. The same procedure was employed as in the case of the rabbits and after seven months the skulls were procured. Not only was the growth of the skull distorted in the lateral plane, but there was vertical distortion as well. There were other experiments upon dogs.

In conclusion, Dr. Baker states that, although he has been working at this problem for a number of years, it has progressed very slowly, due largely to the fact that each experiment extends over so long a period of time, and also because it is a very difficult matter to completely eliminate the functions from one lateral half of the dental apparatus. The persistency with which Nature adapts the occlusion of the interfered-with teeth for use is remarkable and strongly points out the importance of the dental apparatus in the scheme of life. He fully realizes that a hostile observer could criticize this work, as far as he has carried it, as being incomplete; but those who are familiar with the biology of bone growth and who appreciate that muscular activity, blood supply and cellular activity are all bound together in bone development, will appreciate the significance of this line of investigation, and will perceive its importance in the development of the bones of the head and the organs incased therein. The fact that his investigations are perhaps another reason for making the general practitioner appreciate the far-reaching influence of preserving the temporary dentition which serves during the important development period of childhood; and also that orthodontists are referring to it as a plea for the establishment of the occlusal equilibrium early in life, stimulates him to carry still further this slow and patient work.

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EDITORIALS

Referring Patients

THE ethical phase of referring patients in the practice of orthodontia as a specialty, is one which has many sides and which requires considerable attention, both from the general practitioner and the orthodontist. It is also an important question in the relation between the orthodontist and the rhinologist. Those engaged in the practice of orthodontia realize that their patients are referred to them from three sources. In the beginning the majority of patients are sent to the specialist by the general practitioner of dentistry and in a few cases by the general practitioner of medicine. In later years if the practitioner of orthodontia has been successful, a large number of his patients are referred to him by his former patients.

We have already discussed in an earlier issue the responsibility assumed in regard to referring cases which involve a financial consideration; in this editorial, it is not our intention to again dwell upon the commission but upon the ethical side of the moral obligation assumed by the parties involved in this transaction.

It is also necessary to take into consideration the education of the patient which necessarily must be done to a certain extent by the man who refers the case. In dealing with referred cases, we find that there is a vast difference in the attitude of the patients that are sent to orthodontists by some men and those that are sent by others. All cases that are referred to the orthodontist by the profession are necessarily seen first by someone engaged in the practice of dentistry or medicine. It is a lamentable fact that a large number of malocclusions that require treatment from every standpoint are never referred for treatment. The reason of this is probably due to the fact that many practitioners of dentistry do not recognize malocclusion when they have the patient in the chair, or if they do recognize this condition, do not assume any responsibility towards the welfare of the patient, and consequently the case is never referred. We know of several instances where practitioners of dentistry have taken the attitude that, if they are not treating malocclusions, they are not going to look for them; neither are they going to refer them to any particular man. If their patients should ask them regarding the treatment of malocclusion, they state in an offhand way that the malocclusion could probably be corrected, and if asked for advise as to whom to go, will probably name all the men practicing orthodontia in the community and let the patients take their choice. While the general practitioners of dentistry may think that is very fair to the patient and to the practitioners of orthodontia, it nevertheless creates an attitude in the patient's mind which is very objectionable and which often results in a great deal of evil and may result in the case not being treated at all.

In the first place, in order to successfully refer a case of malocclusion to an orthodontist, the dentist must at least know enough about the subject so that he can recognize the malocclusion and be able to present the necessary treatment to the patient in such a manner that the patient will realize that something must be done. To simply tell a patient that he has a malocclusion and that it should be treated, and that he had better go to such and such a man, is the sort of reference which practically accomplishes nothing. If the patient is not already interested in the subject nothing will be accomplished. Therefore in order for a case to be successfully referred, the general practitioner must necessarily instill into the mind of the patient the necessity of having the work done, the evils which will result if not done, and the benefits which will occur if it is done. A patient referred with that kind of an argument comes to the orthodontist prepared to have the case treated, and is not coming out of mere curiosity which is often true in a great many instances. Furthermore, the case should be referred to some particular orthodontist and the practitioner of dentistry should have faith enough in that orthodontist so that he can tell the patient he believes the man can successfully treat the case, and is the individual by whom he wants the case treated. In that manner the dentist assumes a certain amount of responsibility and the patient feels obligated to go to that particular orthodontist and have the case treated. Of course, with that kind of a reference the general practitioner of dentistry must know the orthodontist sufficiently well to believe that he can treat the case successfully, so that the patient will have no chance to criticize the dentist for referring him to a man who was incompetent. Also when properly referred, the patient goes directly to the man referred to with the idea of having the work done.

He has definitely made up his mind, or has been definitely informed as to who should do the work, and consequently, as a rule, follows out the instructions given

by the dentist. On the other hand, if the general practitioner of dentistry simply states that the malocclusion should be treated and names four or five men who are doing that class of work, the patient is soon bewildered in regard to selecting an orthodontist; consequently he has an indifferent attitude, and probably visits all of the men trying to find out which one will do the work the cheapest. The patient is, therefore, placed in the attitude of a shopper, and simply goes from one place to another without any definite idea of what he wants, or who he wants to do his work. In a great many instances of this kind, he finally ends up by not having it done at all, because he has never been properly impressed by the general practitioner of dentistry that something should be done by someone along a definite line. It would therefore be much better for the general public, and everybody concerned, if cases were referred to some one particular man, and the patient impressed that that particular man is the one to do the work. Then the creation of a shopper would be avoided and the patient would feel responsible to his dentist, to a certain extent, and go to the man he recommended.

There is no question but what there is a close relationship existing between the work of orthodontists and rhinologists, and as a result, there is the same question in regard to referring cases from the orthodontist to the rhinologist, or from the rhinologist to the orthodontist, as exists between the general practitioner and the orthodontist. It is a well known fact that there are a great many cases of nose and throat conditions which can not be successfully treated from the standpoint of the patient unless they are treated in conjunction with orthodontic work. This fact is known and realized by a large number of rhinologists, nevertheless many of these rhinologists do not send such patients to orthodontists for treatment. The reason for that is not because the rhinologist has not realized the benefit of orthodontic treatment, but because he does not assume the responsibility in referring the patient to the orthodontist. We know of rhinologists who realize fully the importance of orthodontic treatment, but who, nevertheless, allow their patients to go without such treatment because of the improper manner in which they give advice.

The recommendation for orthodontic services is generally made by the rhinologist saying to the patient that he "should go to see Dr. So and So in regard to his teeth," or in other words, that his "teeth are irregular and should have attention." This advice is usually given when the patient and the parent still have fresh in their memory the operation for adenoids and tonsils, and consequently they are in no state to receive information that something else should be done which necessarily would involve considerable time and expense. If the matter was presented to them in the proper light, so that they were made to realize the benefits of orthodontic treatment after the operation was done on the nose and throat, they would then be willing to have the case carried to completion by having the proper orthodontic services rendered so that the individual could be a proper breather. It is one matter to refer patients to an orthodontist and another to refer them in such a manner that they will go and have the proper services rendered. We therefore believe that in all questions of referring patients more time should be spent to impress upon the patient's mind the necessity of the operation so that he will abide by the advice given by the physician or general practitioner.

The Value of Orthodontic Treatment

THE patient seeks the services of the orthodontist for several reasons. Probably the majority desire the correction of malocclusion for the improvement that will be produced from the esthetic standpoint. In fact, only a few years ago the strongest talking point for the correction of malocclusion was the effect it would have on the facial outline. There is no question but that such malocclusions as mesioclusions and distoclusions produce great facial deformities and the patient is justified in seeking relief from that deformity. However, the results that are obtained from the correction of the facial deformity are only secondary to other benefits that will be derived when the teeth are placed in their proper positions so that the patient can properly masticate his food.

In an article by Dr. O. A. Weiss, which appeared in the June issue of the *International Journal of Orthodontia*, he gives several reason why malocclusions should be treated. There need be little argument made to the patient in regard to the correction of extreme cases of mesioclusion and distoclusion, for those deformities are very apparent. However, there are a number of other cases of malocclusion which do not produce such extreme facial deformities, but which destroy the masticating efficiency of the teeth, and therefore render treatment necessary. There is also a certain class of malocclusion in which the patient is not aware of the serious condition existing, which produce great harm to the teeth and surrounding structures, and the treatment of which would render a great service to the patient. It is very difficult to impress upon these patients the value of orthodontic services. It is a recognized fact that cases of mesioclusion are generally progressive, but it is also a fact that all types of malocclusion are progressive up to that point where the teeth become locked in positions of malocclusion. Consequently neutroclusion cases demand treatment to prevent them from becoming worse. Complicated with these cases of malocclusion are conditions which effect the proximal contact of the tooth and make it impossible for the teeth to be self cleansing, therefore producing pathological conditions which may develop later in life. In fact, the majority of teeth in malocclusion produce a number of dental ills which will effect the patient through life, and which can only be corrected, or prohibited, by having the teeth placed in their proper positions. It is often impossible to make the patient realize the necessity of treatment if the malocclusion does not cause an extreme facial deformity. We have seen cases of malocclusion which were a decided detriment to the patient, the teeth being in such a position that it was possible to predict a number of conditions which would arise in later years.

One example of such cases is an excessive overbite of the upper and lower incisors, produced by infraversion of the molars, which would be a very serious condition if allowed to go until the patient became an adult. As there is very little facial deformity in these cases, and as it requires a great length of time to correct them, it becomes necessary to impress upon the patient the value of the treatment in years to come, rather than the value of the treatment at the present.

It therefore becomes necessary that we educate our patients that the greatest value of orthodontic treatment lies not in the esthetic side, but is to be derived from benefits which occur when the teeth are placed in normal occlusion, thereby eliminating a great many dental ills to which malocclusion is a predisposing cause.

Sixteenth Annual Meeting of the American Society of Orthodontists

THE Pittsburgh meeting of the American Society of Orthodontists, July 20, 21, and 22, proved to be one of the very best ever held by this society. The attendance was large—between seventy and seventy-five. The papers presented showed careful preparation on the part of the essayists and their discussion was spirited and thorough.

The president, Dr. Frederick C. Kemple, left nothing undone that would add to the success of the meeting. Dr. M. N. Federspiel, of Milwaukee, was elected president, and Drs. F. C. Kemple and Ralph Waldron to the Board of Censors. Excelsior Springs, Mo., was chosen as the place for the 1917 meeting, which will be the first week in September. Thirty-nine new applicants were proposed for membership.

The New President of the American Society of Orthodontists



DR. M. N. FEDERSPIEL, of Milwaukee, Wisconsin, was elected President of the American Society of Orthodontists at the Pittsburgh meeting.

Dr. Federspiel was born in Lincoln, Wisconsin, September 15, 1879, the son of Peter and Catherine Federspiel. He graduated from the Dental Department of the Milwaukee Medical School in 1900, and in 1902 from the Angle School of Orthodontia. In 1910 he completed a four year course in the Medical Department of the Marquette University in Milwaukee, and in 1911 was made Professor of Oral Surgery in the Dental Department of this school, which position he still holds. He is at present also a member of the Faculty of the Dewey School of Orthodontia. He is a fellow of the American Medical Association,

member of the Wisconsin Surgical Society, Milwaukee Medical Society, and Wisconsin State Dental Society and National Dental Association. At the present time he is President of the Milwaukee County Dental Society.

To THE EDITOR:

In a recent issue of your journal you published an article for me entitled "Orthodontic Engineering." In this paper reference was made to a publication presented at the International Congress the year previous. The reader was referred to this paper which was jointly written by myself and Mr. Rudolph Hanau. As some confusion has arisen in regard to the dental surveying apparatus, I wish you would publish this letter stating that Mr. Hanau is the inventor of the mapping instrument. Mr. Hanau is also the originator of the mathematical method of determining the arch. The design of the arch illustrated in the article was accomplished by means of the occlusograph, an invention of Mr. Gilbert Dudley Fish, a civil engineer.

Sincerely,

F. L. STANTON.

PROGRAM OF THE SIXTEENTH ANNUAL MEETING OF THE AMERICAN SOCIETY OF ORTHODONTISTS

(Held at Pittsburgh, July 20-22, 1916.)

THURSDAY MORNING.

9.00 *Meeting of Board of Censors.*
10.00 *President's Address*, FREDERICK C. KEMPLE, D.D.S., New York City; *Discussion opened by* FRANK M. CASTO, D.D.S., Cleveland, Ohio, WALTER H. ELLIS, D.D.S., Buffalo, N. Y.
11.00 *Report of Board of Censors.*
11.30 *Habits—Restoration of Functional Activity and Growth of Soft Tissues Involved in Orthodontic Treatment*, O. W. WHITE, D.D.S., Detroit, Mich., *Discussion opened by* BURT ABELL, D.D.S., Toledo, Ohio, GLENN F. BOWMAN, D.D.S., Pittsburgh, Pa.

THURSDAY AFTERNOON.

2.00 *Control of the Overbite in the Treatment of Class II Cases*, HERBERT A. PULLEN, D.M.D., Buffalo, N. Y. *Discussion opened by* ALFRED P. RODGERS, D.D.S., Boston, Mass., LLOYD S. LOURIE, D.D.S., Chicago, Ill.
3.30 *The Development of the Alveolar Process, Illustrated with Original Micro-Photographs*, MARTIN DEWEY, M.D., D.D.S., Kansas City, Mo. *Discussion opened by* M. N. FEDERSPIEL, M.D., D.D.S., Milwaukee, Wis., RICHARD SUMMA, D.D.S., Iowa City.

THURSDAY EVENING. (Union Meeting.)

The American Academy of Oral Prophylaxis and Periodontology.
8.00 *Practical Means of Preventive Dentistry for the Orthodontist*, GRACE ROGERS SPAULDING, D.D.S., Detroit, Mich. *Discussion opened by* R. OTTOLENGUI, M.D.S., D.D.S., LL.D., New York City, D. WILLARD FLINT, D.D.S., Pittsburgh, Pa.
Changes in Pericementum Caused by Chronic Inflammation, F. B. NOYES, D.D.S., M.D., Chicago, Ill. *Discussion opened by* A. E. WEBSTER, D.D.S., Toronto, Can., RUSSELL W. BUNTING, D.D.S., Ann Arbor, Mich.

FRIDAY MORNING.

9.00 *The Development of the Bones of the Face*, WARREN B. DAVIS, M.D., Philadelphia, Pa. *Discussion opened by* MATTHEW H. CRYER, M.D., Philadelphia, Pa., LAWRENCE W. BAKER, D.D.S., Boston, Mass.
10.30 *The Effect of Heat Treatment of Metals Used in the Construction of Orthodontic Appliances*, FRANK A. FAHRENWALD, Cleveland, Ohio. *Discussion opened by* N. S. HOFF, D.D.S., Ann Arbor, Mich., JOHN V. MERSHON, D.D.S., Philadelphia, Pa.
11.30 *Illustrated Talk on the Comparisons Between Ancient and Modern Teeth and Skulls*, M. H. CRYER, M.D., D.D.S., Philadelphia, Pa.

FRIDAY AFTERNOON.

2.00 *The Advantage of Plain Bands on Molars and the Technic of their Construction*, CHARLES A. HAWLEY, D.D.S., Washington, D. C. *Discussion opened by* J. LOWE YOUNG, D.D.S., New York City, J. A. BURRILL, D.D.S., Chicago, Ill.
3.00 *The Records of an Orthodontist*, B. E. LISCHER, D.D.S., St. Louis, Mo. *Discussion opened by* C. R. JACKSON, D.D.S., Indianapolis, Ind., C. W. B. WHEELER, D.D.S., New York City.
4.00 *Recent Progress in Rhinology of Interest to the Orthodontist*, ALLEN H. SUGGETT, D.D.S., San Francisco, Cal. *Discussion opened by* JAMES D. MCCOV, D.D.S., Los Angeles, Cal., B. E. LISCHER, D.M.D., St. Louis, Mo.

SATURDAY MORNING.

9.00 *Important Prenatal Factors Influencing the Development of the Facial Area and Causing Malrelation of the Arches at Birth*, B. W. WEINBERGER, D.D.S., New York City. *Discussion opened by* E. A. BOGUE, M.D., D.D.S., New York City, L. P. BETHEL, D.D.S., Columbus, Ohio.

10.00 Clinics were given by Drs. F. C. KEMPLE, M. N. FEDERSPIEL, F. M. CASTO, D. W. FLINT, B. E. LISCHER, R. OTTOLENGUI, B. W. WEINBERGER, JOHN V. MERSHON, RAY D. ROBINSON, JOS. E. JOHNSON, W. G. BARR, W. A. McCARTER, R. C. WILLETT, W. B. DALTON, GRAFTON MUNROE, V. H. JACKSON, O. W. WHITE, A. KINGSBURY, CARL B. CASE, WALTER H. ELLIS, C. W. B. WHEELER, CHEVALIER JACKSON AND GEO. JOHNSON.

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 1909—Dr. Clarence J. Grieves, Park Avenue and Madison Street, Baltimore, Md.
 1902—Dr. C. Van der Hoven, The Hague, Netherlands.
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 1905—Dr. Frank B. Noyes, 92 State Street, Chicago, Ill.
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